S. HRG. 99-329

ACID RAIN IN THE WEST

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

NINETY-NINTH CONGRESS

FIRST SESSION

AUGUST 12, 1985—DENVER, CO

Printed for the use of the Committee on Environment and Public Works

U.S. GOVERNMENT PRINTING OFFICE
54-972 O WASHINGTON : 1986

S321-9

54-972 O - 86 - 1

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ACID RAIN IN THE WEST

MONDAY, AUGUST 12, 1985

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Denver, CO.

The committee met at 10 a.m. in the Denver Botanical Gardens, Denver, CO, Hon. Gary Hart presiding.

OPENING STATEMENT OF HON. GARY HART, U.S. SENATOR FROM THE STATE OF COLORADO

Senator HART. On behalf of Chairman Stafford and the Senate Committee on Environment and Public Works, it is my pleasure to welcome you to this hearing on acid rain in the West. It is a distinct privilege to chair such a hearing when the list of witnesses includes so many who have devoted their official and scientific energies to understanding and alleviating hazards to our environment.

I asked Chairman Stafford to hold this hearing here, at the foot of the Rockies, for several reasons. First, as the senior Senator from Colorado, I am alarmed to see my State singled out as containing "red flag" areas of vulnerability to acid deposition. The mountainous regions west and north of this city have been so designated in reports issued this year by the World Resources Institute and by the National Clean Air Fund. The latter report received widespread publicity just last week.

Moreover, as a westerner, I am disturbed that so little notice has been taken of air pollution as it afflicts the cities and highlands of our region. Even those who regard the issue as salient for the Northeast or the upper Midwest often know little of the threat we face here. The Nation at large remains virtually unaware of the extent, and even the existence, of the concern we are addressing here today.

Many westerners also greet the notion of Western acid rain with a mixture of shock and disbelief. Environmental quality is the hallmark of our way of life. People come here to escape pollution. Our region's grandeur, its lakes and streams and forests, inspire our native pride and provide much of our livelihood. Their deterioration diminishes us materially and spiritually.

This is precisely why we must be vigilant, because our natural legacy is so vast and invaluable. We still have time to manage this problem for our generation and future generations. If we squander that time, we may lose that opportunity.

Finally, I wanted to hold this hearing because, as a member of the Senate's environmental committee, and as chairman of the Na-

tional Commission on Air Quality from 1978 to the issuance of its report in 1981, I have watched the emergence of the acid rain issue with building frustration. When our Commission issued its report, we already knew acid rain had led to the loss of fish populations in lakes in Canada and the northeastern United States. Yet, we also knew we needed more information before we could respond effectively.

The challenge of environmental protection largely lies in learning enough to regulate wisely and well. That is why we are here today, to discuss what we know, what we are learning, and what we still need to learn.

The elemental problem of acid rain is as simple as gravity. What goes up must, eventually, in some measure, come down. Beyond this point, we immediately confront nature's endless complexities, the remarkable resiliency and fragile sensitivity of air, water, soil and life. In this sense, we have only begun to comprehend the long-term, long-range implications of how we live.

Acid rain presents special challenges, because it arises from so many sources and expresses itself over so broad an area. It defies our notions of local, State, or even national jurisdiction, affecting our relations with our closest friends and allies to the north and south.

Here in the West we face further complications because of this issue. Our acid rain differs from that of the East in its mix of origins and potential effects. Our alpine lakes may prove more vulnerable than their eastern counterparts. We may get more of our acid damage through dry deposition, and our heavy snows may cause heavier deposition concentrations to occur in the spring that, overwhelming ecosystems' ability to cope.

I and our committee hope hearings such as this can help bridge the gap between our best science and the best efforts of legislators and legislation. Whether we need to take another look at the current Clean Air Act or pass separate legislation, we need a firm foundation of the best available evidence, and that is why we are holding these hearings.

I am pleased that we have with us today the Governor of this State, who has done so much to address the whole spectrum of environmental issues, throughout not only his more than 10 years in office as leader of our State, but as a private citizen and concerned citizen as well.

We have invited testimony from the offices of the Governors of New Mexico and Wyoming, and we look forward to hearing from them, as well as other elected officials from this region, representatives of public agencies, both Federal and State, and private individuals concerned about our environment and economic growth.

I am pleased that we can begin this morning with Gov. Richard D. Lamm of the State of Colorado. Governor Lamm.

STATEMENT OF HON. RICHARD D. LAMM, GOVERNOR, STATE OF COLORADO

Governor LAMM. Senator Hart, thank you.

I am joined by Jim Lents of our health department.

You said it so well. Basically time is what really frustrates me in this matter. We are losing that most important resource that we have been given, and that is time to anticipate this problem.

It just seems to me that the facts are clear and overwhelming, the evidence that the harbingers of this problem that hit in Scandinavia and the Northwest and now, as I will testify, in our own State.

The empirical evidence is just overwhelming that we have a problem, and that that problem will grow, and that the lack of reaction, the lack of really the ameliatory steps that can be taken to minimize or eliminate this problem are just simply not being taken.

So thank you for coming and helping us spotlight what is obviously going to be a growing problem.

We know that we have, in parts of Colorado, at times, acid rain that is 10 times more acidic than normal. Precipitation at cities in western Colorado averaged from 4.7 pH to 5 from 1981 to 1984, and this data indicates that acid rain is falling over most of the western slope of Colorado.

Both the pH of rain and snow and the amount of acid pollution which is entering the high country lakes is near or above levels that have caused damage and death to lakes in Scandinavia.

While precipitation acidity in the East is two to four times greater than in the West, the western ecosystems, as you said in your introductory remarks, are much more sensitive.

Many people in Colorado view us as having highly alkaline soils, which is true. But we are so much more vulnerable when you really look at the total, those pristine lakes at this altitude. We figure that acid pollution that is one-tenth of the amount that would cause damage in the East is seen as being equal to cause an equal amount of damage here.

Before the acidity of a lake increases to the point of ceasing biological activity, the buffering capacity must first be consumed. Studies in the Rockies indicate that this buffering capacity is now being consumed. If the decline in buffering capacity continues, some lakes could begin to die.

Snow traps acid pollution for up to 9 months then releases it into lakes over a short period of time. This results in lakes being 70 times more acidic during the snow melts than the annual average. During the last two snow melts, lakes adjacent to Snowmass Wilderness Area were found to have a pH of 4.9.

To compound the problem, the increasing acidity from snow melt occurs at the very same time as many species are in their most sensitive stages of growth.

From 1983 to 1984, biologists found populations of trout and salamanders in the high country lakes which failed to reproduce. These, again, are harbingers in other places of much more serious problems.

Fortunately, scientists have not yet found dead lakes in the Rocky Mountains. Given the decrease in buffering capacity and the projected increase in emissions of acid pollutants, dead and acidic lakes may not be far away.

I talk about smelters in my testimony, Senator, and I say it is a very serious problem. The Governors of Arizona and New Mexico

have taken a lead in this, to their credit, and I think you will hear more about that. The State of Colorado is supporting their efforts in this, and we really urge you to look at the smelter problem.

The nitrogen oxides, most scientists agree that emissions of nitrogen oxides are much more important, if not the dominant source of acid rain in the West, as contrasted with the sulfur emissions in the Northeast.

Federal studies project that the NO_x emissions in the West will increase very significantly. Several actions are needed now to prevent that increase.

The existing NO_x standards for automobiles must be maintained, strict emission controls must be required on new stationary sources, stringent standards from NO_x emissions from light and heavy duty trucks must be implemented, an NO_x increment should be added to the prevention of significant deterioration program.

My testimony also talks about the deposition standard. Ultimately acid rain will be avoided only if the rate of deposition is not above the amount which the vulnerable ecosystems can safely tolerate. It is here that the existing control technology requirements of the ambient emission standards under the Federal Clean Air Act are not sufficient to prevent severe acid rain from occurring.

So I again urge that this is a problem which all of the evidence, absolutely all of the evidence, points to a present and growing problem.

I have outlined a western acid rain strategy in my testimony. I will go through rapidly.

Through the Western Governors' Association we adopted principles—this is all of the western Governors—on National Acid Rain Program, and those principles were incorporated in Senate bill 768, as adopted by the Committee on Environment and Public Works, and are reflected also in Senate bill 53, which Chairman Stafford introduced this session.

Those principles are: We must encourage the most cost-effective emission reductions. It relies primarily upon States to implement emission reductions. Three, it does not impose nationwide costs while providing only regional benefits. Four, it recognizes regional differences in size and types of emissions, climate, and topography. And five, it minimizes emissions from new sources through the application of the best available control technology.

I also, Mr. Chairman, go through the research that we see to be needed in the western ecosystems, hoping that perhaps recognition could be put in the law to look at the special research needed in the West. My Science and Technology Advisory Council is in the process of developing a detailed acid rain research agenda for Colorado, and as soon as that is completed I would like to get it to you.

In summary, a clear and present danger to the high altitude lakes has been identified. Acid rain need not be a price of growth in the West. Reasonable strategies are at hand to prevent acid rain damage in the West. The question to be answered is whether we have the will to act.

Thank you for coming.

Senator HART. Governor, thank you very much. Your entire statement will appear in the record.

I just have a couple of questions, if I could. You mentioned that your agenda for cleaning up acid rain, preventing it from getting worse in the West, was supported by all the Governors. Those include just the Western Governors or all the national Governors?

Governor LAMM. Only the Western Governors.

Senator HART. And that agenda that you have presented to us and that the Western Governors subscribe to is specifically incorporated in the Senate bill that passed the Environment Committee?

Governor LAMM. Yes. It very much is, and is better than some of the other proposals that we've seen in Congress which we feel are not cost effective and impose too great a burden on the whole Nation for regional benefits.

Senator HART. We appreciate Mr. Lents being here with you, and let me just ask either or both of you one final question.

Is Colorado unique in the West with regard to this problem because of the relatively high degree of auto emissions in the Denver area, and the topographical and meteorological uniqueness of the Denver Front Range location? Do either of you know an answer to that?

Mr. LENTS. I think from the perspective of acid rain I don't think Colorado is unique. I think the data that I've looked at suggest that not only Colorado but a number of other States have equally sensitive ecosystems in the Rocky Mountain West.

Certainly Denver represents one of the higher population areas, and that's a major source of nitrogen oxides to the mountains. There's certainly data that Denver is creating some acid deposition problems in the Front Range areas east of the Continental Divide.

Senator HART. But other than that, no peculiar problems caused by our location or the high degree of auto usage?

Mr. LENTS. I don't think so from the acid rain viewpoint. I think certainly from localized air pollution problems within Denver, the meteorology impacts it.

Senator HART. Governor, thank you very much.

Governor LAMM. Thank you.

Senator HART. I know you are busy, and I appreciate your testimony. The committee will obviously pay a great deal of attention to it.

We are extremely pleased to have the Governor of our neighboring State to the south, Toney Anaya, who has come all the way up from New Mexico to be with us. Governor Anaya has spent a great deal of his time in office on a wide range of environmental problems, and I know is deeply concerned about the emerging issue of acid rain.

I appreciate, and the committee appreciates, your concern and consideration, Governor, in taking the time and going to the trouble to come up here, and we look forward to hearing your statement and your testimony.

STATEMENT OF HON. TONEY ANAYA, GOVERNOR, STATE OF NEW MEXICO

Governor ANAYA. Senator Hart, thank you very much, first of all for having these hearings in the region so that Governors of the

region can appear and testify. I appreciate very much the leadership role which you are taking in this regard.

Let me also commend Governor Lamm, who has worked on an acid rain task force in the past and has provided some guidance to many of us in the West to follow. Certainly much of what I would have to say would follow pretty much in line with what Governor Lamm has already testified about.

With your permission, Mr. Chairman, I would like to submit my entire statement for the record, and then just very briefly summarize the main points, if I may.

Senator HART. Without objection. And, Governor, you might introduce those accompanying you here today, if you would.

Governor ANAYA. With me today is Denise Fort, the director of the Environmental Improvement Division, immediately to my left. I have elevated that department to a cabinet-level department. And Cecilia Williams, who is the chief of the Air Quality Bureau in my department.

Senator HART. Glad to have you here.

Governor ANAYA. Mr. Chairman, New Mexico shares many of the same concerns as Governor Lamm has already testified to with respect to Colorado. I think if there is any issue or any point that I would want to underscore here today, it is that acid air pollution is a national problem, and not simply a regional problem, despite the fact that most of the attention in the past has been concentrated in the Northeast and, to a certain extent, in the Midwest. But as we are starting to recognize the potential problems or what causes the acid rain and the end results, we are finding that it is, in fact, a national issue, not just simply limited to one particular region.

I would like to comment and supplement some of the points that Governor Lamm made, and particularly refer to the problems that we have in this region as a result of the copper smelters that we have in what we call the gray triangle.

As you know, we have a giant Phelps Dodge smelter at Douglas, AZ. We have one plant in Mexico in Cananea, and a second one that is under construction at Nacozari, Sonoro, also in Mexico. These three giant smelters that have little or no controls on them from what we call the gray triangle, and are continuing to spew literally millions of pollutants into the air. The one at Douglas, AZ, continues to spew its acid pollution with no sulfur dioxide controls and with frequent violations of the Federal primary health related national ambient air quality standards. Although this smelter is expected to close by the first of 1988 when the non-ferrous smelter order exemptions to the Clean Air Act expire, another congressional extension is a possibility, a possibility we would encourage you and urge you to oppose strenuously.

At Cananea, Sonoro, Mexico, 45 miles southeast of Douglas, a smelter currently is operating without sulfur dioxide controls, emitting some 380,000 tons of sulfur dioxide per year.

In the meantime, 60 miles south of Douglas at Nacozari, Sonoro, Mexico, under a 932-foot smokestack, a new world class copper smelter even larger than the Douglas one is nearing completion with no sulfur dioxide controls whatsoever.

It is certain that the present emissions from Douglas and Cananea already create massive pollutions in southern Arizona and

Sonora. What concerns me is evidence that this acid plume is transported across state and international borders, depositing pollution in New Mexico, Utah, Colorado, Nevada, Wyoming, Idaho, and possibly even southern Canada. Without comprehensive efforts now by the western States and the governments of the United States and Mexico, and the State of Sonora, this massive acid air pollution will double in the next few years as the gray triangle of Douglas, Nacozari, and Cananea comes into full uncontrolled operation.

That is spewing what has been estimated by the Congressional Research Service to be 1.2 million tons of sulfur dioxide into the air each year.

Evidence of acid rain damage has been well documented in foreign countries, Scandanavia, Germany, and the Eastern United States. Now evidence of damage is surfacing right here in the West in the Rocky Mountain States.

In my prepared testimony I outline some of that evidence, and much of it underscoring what Governor Lamm has already testified to, so I won't repeat it here in my comments. But in my prepared testimony we do outline some of the evidence that is starting to show up.

Very recently, and we have yet to receive a copy of it although I understand we may get access to it this week, there is a new draft EPA study that has come out concentrating on ten western states, the states of New Mexico, California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming. It is my understanding that that report, with the maps, will show that the acid rain problems in the West are in fact increasing rather dramatically.

It is unfortunate that in the past the attention has been in the Northeast and the Midwest, and to a certain extent, while the attention is being placed in the West now, I would caution the committee, caution the chairman, that we should not limit that attention simply to high mountain lakes or to some of the wilderness areas, that we have tremendous problems not only in high mountain lakes and wilderness but also in our arid parts of this country.

I have encouraged the EPA; the Administrator, Lee Thomas, was at our National Governors' Association, and I questioned him during one of our committee hearings, encouraged him very strenuously to be studying this particular area, and he committed he would. But I suspect he probably will need a little bit of urging.

I would underscore one other point that Governor Lamm made with respect to the Western Governors' position, with respect to opposing imposing national costs for strictly regional benefits, and while I don't want to sound parochial or regional, I would underscore that we in the Southwest, with the exceptions that I have already noted, have taken some very strong steps, have already undertaken the costs of putting in some of the cleanest acid air pollution controls in the United States. I think that the southwestern industries are in fact at the forefront, with the exceptions that I have noted.

For example, the Kennecott-Mitsubishi renovation of the entire Santa Rita-Hurley, NM, copper mill mine and smelter now stands as the world benchmark of cost efficient copper production and pol-

lution control. The same can be said of the renovation of Kennecott's Hayden, AZ, smelter. The Phelps Dodge smelter at Playas, NM, constructed in the 1970's also utilizes modern controls. And Public Service Co. of New Mexico and Arizona Public Service Co. have taken extraordinary steps to reduce acid air pollution in the Four Corners area.

So we feel that industry, by and large, in this part of the country has already moved forward. We have already, as consumers, started paying the costs of the clean air, and we would encourage that these same kind of steps be taken nationally.

In my prepared testimony I have made a number of recommendations with respect to—for your consideration—with respect to any Federal legislation that would be passed. I would just very quickly summarize the points; I feel that if acid air pollution is to be controlled we have to take several approaches simultaneously.

First, the Douglas smelter must be brought into full compliance with both Arizona public health protection requirements and the nonferrous smelter order provisions of the Clean Air Act.

Second, the negotiations with Mexico must proceed on a fair and realistic basis. Nacozari must not be allowed to be an operation without adequate controls.

Third, all new facilities, large and small, which emit sulfur dioxide or nitrogen oxides must be required to use the best available control technology.

And fourth, I suggest that the acid rain legislation which addresses Western issues should direct EPA to determine if nitrogen oxide increments should be added to the Federal prevention of significant deterioration standards, require state implementation plans to address the total amount of acid deposited into sensitive watersheds so that water quality standards readily adopted under the Clean Water Act are protected, and fund adequate research on acid deposition impacts in the Western States, especially in arid regions such as New Mexico.

Clearly, it is time for the entire Nation to recognize not only the benefits, but also the responsibilities of economic growth involving industries which contribute to regional acid air pollution.

It is also time for the country to recognize that acid rain is not merely a regional issue, or even a national issue, as I indicated earlier. It really is an international one.

Mr. Chairman, I again thank you for the opportunity to appear before you. I would be happy to try to respond to any questions.

Senator HART. Governor, thank you very much for a fine statement, and again for your efforts in coming up here to testify. Your testimony is very important to this committee, and we appreciate it very much, particularly on the specific industries which you addressed.

Taking off from your concluding remark, I recall just 5 years ago I had the opportunity to chair the National Commission on Air Quality. The acid rain issue was considered at that time, just a few short years ago, as a marginal issue at best, and a regional issue only. The national implications were almost totally not understood, and certainly the international implications of acid rain were not even begun to be addressed at that time.

Since that time, the administration has come face to face with the problems caused to Canada by United States pollution to the Canadian environment. And you have added a new dimension here, the additional dimension of damage done to the United States air quality by emissions from Mexico.

Could you suggest to the committee how—the degree to which, if you know factually, or just have an impression—the degree to which the acid rain problems of the Southwest, particularly your own State and Arizona, are caused by smelter emissions in the United States, the Southwest of the United States, as opposed to those in Mexico. You have mentioned both causes. Do you have any evidence or any data, or those with you, as to the relative proportion of damages done by emissions in this country versus those in Mexico?

Governor ANAYA. Mr. Chairman, I can only give you an educated guess at this particular point in time, because unfortunately most of the studies are just now being initiated in the southwestern part of the United States to try to determine to the extent that we do have a problem and the extent to where that problem originates.

But in our own reviews, and this is just from the State of New Mexico itself, in our own analysis of whatever data is available, I would submit that, to the extent that we do have acid rain problems that are starting to grow, that by far the single biggest source of those problems are the three smelter plants in the gray triangle. Of course, one of those is not on line yet, it will be coming on line this next year. So we are basically right now looking at Douglas, AZ, and Cananea, Mexico. And as between those two, I would submit that they are probably equally culpable in terms of the damage that is being caused right now. Certainly once Nacozari comes on line, there would be no question in my mind that without pollution controls the single biggest pollution problem we would have would be coming from Mexico.

I think what concerns many of us in the Southwest, and should concern us as a country, a couple of problems: One, copper is a very important product in New Mexico. It's important in Arizona. We have already undertaken the costly steps of making sure that we have pollution controls in New Mexico. So we are at a competitive cost disadvantage when compared to the Douglas smelter or Mexico, throwing many of our copper workers out of jobs. In fact, our copper smelters are almost shut down now because we are not able to compete on a price basis.

Second, the fact that the smelters in Mexico, especially the new one, is being built with a substantial amount of IMF money, which comes from the United States. So we are very concerned that our own tax dollars are being used to finance a smelter without pollution controls that, in turn, is throwing our miners out of jobs. It's a very serious problem.

I appreciate the fact that the EPA and Mexico have come to some tentative agreements on the Nacozari plant, but we think that it has to be pursued even further to get some interim controls on Cananea as well as Nacozari until the full controls are in in 1988. And I think that the full weight of Congress is going to have to be applied to EPA to make sure that comes about.

Senator HART. One final question, Governor, on economics. You mentioned the importance of the smelting plants and that entire industry to the regional economy. I think you also alluded to the fact that your State, as ours, has an economic base in tourism and so forth.

Have you reached any conclusions, yourself, as to whether the Federal Government has begun to strike the right balance between protecting the environment and the economic interests that go with environmental quality versus letting the copper industry and other smelting industries continue virtually unabated?

Governor ANAYA. Mr. Chairman, as you indicated, tourism is certainly important to New Mexico as well as Colorado. It is our second largest revenue producer in the State of New Mexico, so we obviously need to be concerned about that as an economic issue, as well as the environment.

In my judgment, I don't think that the Federal Government has struck that balance. And I'm not just referring to the current administration. I don't think that the national administration has ever struck that proper balance. But I have been particularly concerned with the policies of the current national administration for the past 5 years, that the balance has been shifting to economic interests to industry, as opposed to some of the other concerns that we would have of the tourism impact, the impact on the environment, and so on. I say that again underscoring that we do appreciate the way in which EPA appears to be moving in its negotiations with Mexico, and we hope they continue.

But I would have to, in all frankness, admit that I have a great deal of disappointment that the policies of the national administration—in the past they seemed to be evening out—but in the past with, certainly, Mr. Jim Watt around, the emphasis had been to turn everything over to the private interests and not much concern with respect to tourism or the environment.

Senator HART. Thank you once again for taking the trouble to come up here.

We appreciate your testimony and the remarks that you have made, and they will be taken very seriously by the committee and my colleagues in Washington when we seek to get some resolution of the acid rain problem as quickly as possible.

We appreciate what you have had to say.

Governor ANAYA. Thank you very much, Senator.

We will be prepared to go anywhere we need to to help out.

Senator HART. Thank you. And thanks to those who have come with you.

We invited the Governor of Wyoming, Gov. Ed Herschler, who was unable to be with us but did send a representative.

We want to hear from his representative, Mr. Randy Wood, presently. But we first would like to hear from Congressman Tim Wirth, if we could, who we are pleased is with us.

We are glad to have Congressman Wirth here, who has been very concerned about the acid rain problem and a wide variety of other acid rain questions. His testimony, of course, would be extremely important to our committee.

Congressman, thank you.

STATEMENT OF HON. TIMOTHY E. WIRTH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF COLORADO

Congressman WIRTH. Thank you very much, Senator Hart, for holding this very important hearing and for including me with this distinguished panel of public officials, scientists, and others.

I will be very brief this morning, as you have a long list of very distinguished witnesses.

In my testimony, Senator Hart, I cannot underemphasize the urgency of the public health and environmental issues before us as a State, as a region, and as a country.

Yesterday a giant cloud of chemical gas sent 200 people to the hospital in West Virginia. Last weekend we saw the collision of two trains in Denver, closing the Boulder Turnpike. Those trains could have been carrying toxic materials; happily they were not. A disaster was avoided by luck.

Last Sunday a truck carrying bombs overturned in Oklahoma. Three of those bombs exploded. That could have been our mousetrap.

And today we are hearing testimony, evidence of increased acid rain problems causing very, very significant problems for us in the State of Colorado and throughout the West.

All of this is part of a fabric of public health and environmental issues which are in need of very, very urgent attention.

These, as you have pointed out in your distinguished career working in the area of clean air and other issues, these are not new in character, not new in quality. What they are are new in intensity and new in quantity, and it is imperative that we develop, as Governor Lamm pointed out, the political will to take these issues on.

How are we going to do that? Perhaps it's a combination of fear coming out of the Bhopal kind of disaster that could have happened here, did happen in West Virginia, did happen in India. Perhaps it's attitude by the environmental concerns that have been expressed so well by you and many others. And perhaps by the economic issues that you alluded to in your discussion with Governor Anaya. I have outlined many of those and the importance of these economic issues to us in the State of Colorado.

Now, we have, together, been working on a variety of clean air legislation, battling for a strong Clean Air Act over the years. We turned back an attempt 2 years ago to erode the Clean Air Act. Now it's even more urgent that we act, and the evidence that I think you'll hear this morning from the Rocky Mountain Biological Lab suggests that the problem of acid rain in the mountains is even worse than we had all thought, worse in their 6 years of measurement this summer.

I would like to emphasize just very briefly the specifics related to the auto industry. Governor Anaya spoke very well of the problems that we face with smelters.

In the auto area, earlier this year the Environmental Protection Agency after years of delay, promulgated tailpipe emission standards for light- and heavy-duty trucks.

While considerable evidence suggests that these standards may in fact be too lenient, the promulgation of even an initial standard is certainly a step in the right direction.

But lest we think that the battle to control auto emissions in the West is won, let me remind you that as we sit here today the auto industry is seeking to downgrade even those minimal standards that were put in place by the EPA, to downgrade the revisions of tailpipe standards for vehicles operated at high altitudes such as Denver. That kind of downgrading would achieve nothing less than undermining any minimal progress that we might attain through these tentative first steps.

This is a fight that we cannot afford to lose.

In 1980 as I pointed out, 1982 as I pointed out, all of us from this region succeeded in defeating a coalition of interests that wanted to include those changes that were sought by the industry, and we were able to table that legislation, which would have been very damaging to our State and to our environment, and we are going to have that battle again this year.

To stand guard against attempts to weaken the Clean Air Act, however, is not enough.

We must actively seek, as the two previous witnesses have suggested—we must actively seek to strengthen the Clean Air Act. Any such effort must include a national acid rain control program, which addresses the problems of the Northeast and the West.

That package must also include initiatives to control the release of dangerous and cancer-causing chemical gas emissions into our air. For the West Virginia problems, an initiative similar to legislation which I have introduced in the last two Congresses forcing the EPA to take on the toxic chemical issue.

The challenge that we face in crafting a western acid rain control program has to be both decisive and balanced; bringing domestic shelter emissions under control, smelter emissions under control; as the Governor suggested, securing the cooperation of our Mexican neighbors, which we must depend upon the administration and the State Department to help in; and guarding against severe increases in NO_x loadings are the minimal steps that have to be taken.

Initial specifications for legislation in this area have been crafted, and we look forward to working with you and your colleagues in the Senate in developing a strong and forceful piece of legislation that addresses this severe problem as part of the overall strengthening, needed strengthening of the Clean Air Act.

Again, I thank you very much for including me today, and I would hope that my statement could be included in full in the record.

Senator HART. It certainly will be, Congressman, and we appreciate your being here and the evidence that you have presented. As with the Governors and other elected officials, indeed our entire list of witnesses, these statements will be taken extremely seriously by our committee in the Senate, which as you know generally has tried to achieve the results that you and I both want.

I know you were here for Governor Lamm's testimony. I don't know whether you had a chance to see the full text of that, but he alluded to an agenda which he set out in his testimony as endorsed

by the western governors, which he said by and large was incorporated in the bill which the Senate Environment Committee passed on the issue of acid rain and other air quality questions as well.

To the degree you are familiar with that agenda generally or specifically, could you subscribe to it yourself?

Congressman WIRTH. Absolutely. Not only subscribe to it, but I have had discussions with Congressman Waxman, who chairs the Health Subcommittee on the House side, of which I am also a member, who is more than eager to include that in legislation which he would like to initiate on the House side as well. So that agenda, I think, is in the legislation that you have been involved with on the Senate side that we would like to try to move on the House side now that we are through the agreeable discussions on the Superfund legislation. Now that we are through that on the committee, we can move to clean air and the agenda referred to by the Governor, which you have included in your legislation and will also be in the House bill.

Senator HART. Finally, as you know, this issue has divided regions sharply. The Northeast from the industrial Midwest. Now the West is becoming also an active participant in the dialog and debate.

Do you sense in the last year or two any lessening of the confrontation, if you will, that existed in the early 1980's between the industrial Midwest and the Northeast, politically, in the House of Representatives on these questions? Do you think we are getting any closer to kind of a national consensus on the issue? If not, or if so, what role can those of us from the West play in trying to get some national agenda, in effect?

Congressman WIRTH. Well, Senator, I wish I could say that there had been a diminution of the regional battle that is going on. The economic concerns in the Middle West, in the industrial area, combined with the laisse faire attitude of the administration, has made it extremely difficult to find a majority of the vote.

We tried a year and a half ago, you remember, to develop a strategy which would pick up New England, effectively buy off the 50 largest powerplants in the country, and have that come at cost to every utility user in the United States. It appeared to me and to other sponsors of that legislation as the only way in which we could get a majority of the votes. And if you don't have a majority of the votes, you have an absolute chance of not winning, and the purpose was to try to get a strong Clean Air Act.

We lost by one vote, and that vote was the result of that Midwest coalition that effectively said let's not do anything.

I think what we have to do now is to figure out another way of finding a majority of the votes, and perhaps that's coming around the country in a different fashion to pick up the New England votes and the Rocky Mountain western votes who are together on this issue. But we together don't have a majority.

We have to come, it seems to me, then, a southern route and see if we can pick up votes from the southern tier of the country in the House to gain 218 votes.

That's a strategy that I think we have got to now pursue, given the reluctance of the industrial Middle West to work with us on trying an acid rain abatement program. There are particular prob-

lems in the Commerce Committee with the very strong representation there from the States of Michigan and Ohio and other places, and we just have to try it a different way to get a majority in a different fashion.

Senator HART. Are you convinced whether the issue is electricity generation, coal consumption in the industrial Midwest, or the smeltering industry in the Southwest, that reasonable emission controls can be imposed on those industries and they can still remain competitive, and not adversely affect the environment?

Congressman WIRTH. Well, I think that the answer to that question goes in part with our relationships with the country of Mexico.

It seems to me that we as a country cannot ask the Mexican Government to put stringent controls on the new smelter that they are building there if we are not willing to do so in terms of our smelter in Douglas. And it seems to me that we have got to show good faith, and also recognize the fact that the Mexicans are desperate for an economic base, and we can, it seems to me, help them achieve that by taking those steps in Douglas that will help them, encourage them to put the controls on, and help to make the two industries competitive, make us competitive with that Mexican smelter. They are going to be new, it's going to be very large, but I think we can still do that.

But that demands our recognition of the fact that the Mexicans have very, very real economic problems. And we have to set a standard ourselves related to Douglas if we are going to ask them to do that, too.

Senator HART. That's a very important point. Congressman, thank you very much. Appreciate your being here.

Congressman WIRTH. Thank you very much, Senator Hart, and I will look forward to working with you. Thank you very much.

Senator HART. Our next witness will be Mr. Randy Wood representing the Governor of the State of Wyoming.

Mr. Wood is the administrator for Wyoming's Air Quality Program.

We appreciate you coming down, Mr. Wood, and representing your Governor. Thank you for being here. Please proceed.

STATEMENT OF RANDY WOOD, ADMINISTRATOR, AIR QUALITY PROGRAM, STATE OF WYOMING

Mr. WOOD. Thank you, Mr. Chairman.

First I'd like to offer our appreciation on behalf of Governor Herschler for the invitation to come here and speak to you on this very important issue today.

I do appear today on behalf of the Honorable Ed Herschler of the State of Wyoming. Because of recent tragedies in Cheyenne and other important commitments, the Governor is simply unable to be here today, and offers his apologies to the committee.

I have provided your staff with a copy of the written statement for the record from Governor Herschler, but I shall provide a brief summary of that.

First it is clear to us that our scientific knowledge of acid rain has not caught up with the politics of the acid rain issue, and as a result the emotional tail may well wag the dog.

However, while we believe that much additional knowledge and information must be gathered before we can fully understand the implications of all of our actions and decisions, we remain firmly convinced that we know enough to begin to develop the strategy which will allow us to take actions as it is appropriate.

It seems reasonably clear to us that acidic deposition in Wyoming is significantly tied to long-range transport of pollutants from out of State. Therefore, our ability to address any problems associated with such deposition is quite limited.

For the same reasons, if acidic deposition problems currently exist or occur in the future, Wyoming's ability to accommodate economic development could clearly be limited because of emissions from these out-of-state sources.

In order to address this concern, the State of Wyoming would urge Congress to consider some very specific revisions to the Clean Air Act.

First, we believe that Congress has already provided a very suitable mechanism to address interstate air pollution through the provisions of sections 110(a)(2)(E) and 126, and would urge Congress to extend these provisions to include adverse effects on air quality related values in class I areas resulting from interstate transport of acidic deposition.

We believe a clear rationale for this proposal exists when one examines the current provisions for the prevention of significant deterioration.

Under the PSD provisions the State of Wyoming must consider the impact of its own air quality related values of emissions from proposed new facilities, in the same manner as an analysis must be done for compliance with national ambient air quality standards and PSD increments for total suspended particulate matter and SO_2.

In the case of SO_2 or total suspended particulate matter, other States must also include in their implementation plans provisions prohibiting the violation of such ambient standards or increments in Wyoming. However, since the provisions of 110(a)(2)(E) and 126 do not extend to impacts on air quality related values in class I areas, upwind States may well allow emissions which are otherwise in compliance but would cause adverse effect on our wilderness areas.

As a result, the State of Wyoming would be precluded from issuing permits for new sources which might produce a very small incremental adverse impact in such class I areas.

We would urge Congress to provide States such as Wyoming with an ability to address this problem.

Our comments with regard to the smelter industry are short and simple.

First, we believe the nonferrous smelter industry should be required to implement compliance programs under the current schedule of the Clean Air Act, and the Clean Air Act should not be revised to extend those schedules.

Second, we believe that smelter emissions in Mexico must be controlled to the same extent that is to be required of the United States smelter industry. We believe it makes little sense to require the control of the U.S. smelter industry while ignoring an equally

large increase emissions from the smelter industry south of the border.

With respect to research, the State of Wyoming is also dismayed that the current federally funded acidic deposition research programs, which operates under the auspices of NAPAP, is so skewed toward the northeastern United States. According to the figures available to us, it appears that $87 million of the available $88 million research program is dedicated predominantly to addressing research needs in the eastern United States, while only $1 million is dedicated to research needs specific to the West.

We would urge Congress to assure that a more proportionate part of the research dollar be dedicated to issues which are specific to the West.

As a final comment, we would object strenuously to the suggestion of some interest groups that the provisions of section 125(d)(2)(C)(i) be revised to convey to the Federal Land Manager the final decisionmaking authority on PSD permits for facilities which may have some impact on Federal lands.

We believe that Congress has established a rational decisionmaking process regarding such situations, and we believe that the authority should continue to rest with the State.

That concludes my summary of Governor Herschler's statement. I would be pleased to answer any questions you have.

Senator HART. Mr. Wood, thank you very much. We appreciate your presence and we appreciate the Governor's interest and concern.

Let me ask you just the reverse of a comment that you made about the smelter situation. You said that you thought it was unfair for United States smelters to have to meet a certain standard if Mexican smelters did not. Would you also agree to the reverse proposition, that it would be unfair for us to insist that Mexican smelters meet a certain level of emission control if in fact American, United States smelters did not meet those levels as well?

Mr. WOOD. Perhaps our answer to that, Senator Hart, is that we believe that U.S. smelters should meet those levels of control. I think both of them, in our view, are givens. Both sides of the border must control SO_2 emissions from the smelter industry if we are to avoid an impending problem.

Senator HART. Do you have evidence either from Federal research or your own State effort as to where the bulk of the acid rain depositions are coming from in the State of Wyoming?

Mr. WOOD. We have extensively reviewed all of the data available to us. Unfortunately, Senator Hart, the data base available is simply of such short-term nature that it is difficult to draw any major conclusions. However, what is available does indicate to us that the predominant part, perhaps over 50 percent of the acidic deposition occurring in the State of Wyoming, is from long-range transport, as versus the sources in the State of Wyoming. And it is quite possible it is well in excess of that.

Senator HART. How long range is long range? Is that the Pacific Northwest, or is that from the Far East, or where?

Mr. WOOD. The data available and the meteorological conditions which exist in the—I'll call it the North Central Rockies—is such

that the State of Wyoming is somewhat in a split pattern. We have transport winds from the southwestern United States, Arizona, southern California area. We also, in part of the northern part of the State, have transport winds which originate predominantly in the northwestern United States. So I would simply have to say that I don't think we have much of a problem from the northwestern United States. The acidic deposition that's coming from long-range transport comes from outside of our borders to the southwest, perhaps as far away as southern California.

Senator HART. Have you been able to document any near-term economic, adverse economic effects from acid rain, to agriculture, tourism, or the fisheries, or anything else?

Mr. WOOD. The State of Wyoming has not seen any information whatsoever that tells us that we have an actual acid rain problem in the State right now. What it is producing adverse impacts on is the fisheries, the forests, that sort of thing. The adverse impact which is, perhaps, in the near future, would be the impact of having to deny permits for new industry in the State because of existing deposition occurring as a result of out-of-State emissions.

Senator HART. Mr. Wood, please convey our thanks and best regards to Governor Herschler, and we appreciate very much your taking the time and trouble to come down. We appreciate your testimony.

Mr. WOOD. Thank you.

Senator HART. Thank you.

Our next witness will be Mr. John Malanchuk, who is Acting Director of the Acid Deposition Staff of the U.S. Environmental Protection Agency. Mr. Malanchuk.

It is my understanding you are accompanied by Mr. Larry Svoboda, Region VIII Coordinator for EPA, Western Atmospheric Deposition Task Force. Is that correct?

STATEMENT OF JOHN MALANCHUK, ACTING DIRECTOR, ACID DEPOSITION STAFF, OFFICE OF RESEARCH AND DEVELOPMENT, ENVIRONMENTAL PROTECTION AGENCY

Mr. MALANCHUK. Yes, it is. Good morning, Mr. Chairman.

As you said, my name is John Malanchuk, and I am Acting Director of the Acid Deposition Assessment Staff in EPA's Office of Research and Development. With me today is Larry Svoboda, of the Denver Region VIII office. Mr. Svoboda serves as Manager of Region VIII's Acid Deposition Staff, and serves as Coordinator of the Western Atmospheric Deposition Task Force.

We are happy to be here today to represent EPA and to share with this committee our perspective of the National Acid Deposition Research Program, its plan for conducting research in Western States, and the current state of our knowledge concerning acid deposition effects in western ecosystems.

The Federal acid deposition research effort is managed through the National Acid Precipitation Assessment Program [NAPAP], of which EPA is a member, along with 11 other Federal agencies. NAPAP conducts research that is designed to reduce the critical scientific uncertainties in the acid deposition phenomenon. Our

overall research strategy is to investigate the effects, sources, and transportation of acid deposition and its precursors.

For each major effect area, we are striving to learn the nature, extent and magnitude of current damage, and most importantly, the prospect for future damage.

In the areas of atmospheric science, we are actively seeking an improved understanding of the physical processes involved, and are incorporating this understanding into mathematical models that simulate both atmospheric chemistry and meteorology on regional and local geographic scales.

Our current fiscal year 1985 and proposed 1986 programs emphasize improved understanding of the ecological effects of acid deposition and its precursors on forest and aquatics resources.

I would like to speak briefly about how NAPAP and EPA have set their research priorities.

Our research on ecological effects has concentrated on three major priorities. First, determining the extent and magnitude of current damages. Second, developing the capability to predict the rate at which future damages might occur at current deposition levels. And third, projecting the response of various ecosystems if deposition levels were to change.

The achievement of these goals has required the development of new and novel research approaches. Effective testing of these approaches requires us to apply them first to those areas of the country where damage is most likely to occur.

Once these approaches are refined and demonstrated to be effective, we can apply them to our full national effort.

Additionally, from the standpoint of national policy development needs, we have placed first priority on studying those areas most clearly threatened by acid deposition. These are areas where effects have been well documented or where we believe both deposition and potential sensitivity are at their highest.

Lower priority has been given to those regions of the country which lack well documented damages from acid deposition, and to areas which have only moderate levels of deposition and/or less sensitive resources.

This has meant that the pursuit of specific research interests for many regions, both in the East as well as in the West, has had to be of lower priority until we have a better sense of what can be learned through completion of research now underway. However, in both aquatic and terrestrial effects, an orderly expansion of our research efforts is planned to include western ecosystems.

To help facilitate and guide this expansion, EPA's Region VIII, under the leadership of Regional Administrator John Welles, has organized the Western Atmospheric Deposition Task Force. This task force, composed of Federal, State, and private agencies involved in various ways with research or management of atmospheric deposition, serves as a central clearing house for identifying research needs and priorities of the Rocky Mountain West.

The task force not only works to help support NAPAP research, but also to serve as a vehicle for coordinating research outside the national Federal effort.

Despite recent claims of acid rain damage, there has been no documented scientific evidence that ecosystems in the Rocky Moun-

tain region have already been damaged by acidic deposition. This lack of evidence, however, does not allow us to conclude that no real or potential problem exists in the Rocky Mountain region. From the EPA perspective, there is simply not enough scientific information available to determine either the existing situation or future trends.

The primary reason for this lack of understanding of the acid deposition phenomenon in the West has been the limited research and monitoring specifically addressing this region. As mentioned earlier, the Federal Research Program, which is national in scope, is only just beginning to expand its efforts to intensively look at the West.

Academic and private research efforts have been, for the most part, limited and highly fragmented. It is only through additional research that we will know the extent to which acid deposition may be a significant western problem.

Limited research and monitoring has revealed that many potentially sensitive watersheds do exist in the Rocky Mountain region. These watersheds contain high elevation lakes with very little acid neutralizing capacity. While no damage to these systems has been measured, it is the general scientific opinion that these watersheds have only a very limited capacity to assimilate acid deposition inputs.

In our written testimony submitted to the committee, we have provided a concise description of what is known about acid deposition in the West and our related research activities. We hope the committee will find these useful.

Before closing, I would like to emphasize that moving forward in gaining a better understanding of acid rain science is clearly a high priority. However, the accurate communication of the results of this research to all interested parties, and especially to the public at large, is equally important.

We believe it is critical for the American public to have a clear and undistorted understanding of this complicated problem.

We are pleased to have had an opportunity to testify before this committee, to share our understanding, and to describe our research activities. EPA Administrator, Lee Thomas, and EPA staff welcome the opportunity to interact with this committee on this important and controversial issue.

This concludes our oral testimony. Mr. Svoboda and I will be glad to respond to any questions.

Senator HART. Thank you very much, Mr. Malanchuk. One statement you made that jumped out at me is that you are not presently prepared to document any damage done from acid rain in the region. Do you really mean that?

Mr. MALANCHUK. What I mean by that statement is to say that there are certainly site-specific studies that have been done in many places. It's very, very difficult to draw regional conclusions based on site-specific information.

Senator HART. Yes, but that's not what you said, I don't believe. What you said was—go back and repeat that statement, if you could find that one sentence.

Mr. MALANCHUK. Could you point out where it is, please?

Senator HART. It was about the third or fourth paragraph from the end, I think. Next-to-the-last page, maybe. Where you said we are not presently prepared to document—I didn't write it down, but it was something like we cannot presently document any damage from acid rain in the West.

From an EPA viewpoint, there is simply not enough evidence to what?

Mr. MALANCHUK. To determine either the existing situation or future trends, on a regional basis.

Senator HART. What was the sentence before that?

Mr. MALANCHUK. Despite recent claims of acid rain damage, there has been no documented scientific evidence that ecosystems in the Rocky Mountain region have already been damaged by acidic deposition.

Senator HART. You really believe that?

Mr. MALANCHUK. We are about to embark on the western lake survey, which is part of the national surface water survey, in EPA. This is a statistically based sample of lakes, which we will go out and in a valid, scientific manner demonstrate what the extent and the nature of the problem is. This should get underway in fiscal year 1986.

Senator HART. But at the present time, pending that research, you don't have any scientific evidence of any acid rain damage?

Mr. MALANCHUK. We don't have scientific evidence to say that there is a regional problem.

Senator HART. I'm glad you clarified that, because that's not what I heard from that sentence that you read. I think that sentence says, when sorted out, that you have no scientific evidence of any damage to any ecosystems in the West.

Mr. MALANCHUK. Certainly there are site-specific reports that suggest that there have been damages.

Senator HART. Have you evaluated those, or do you have any opinion on those? Including, for example, the World Resources Institute report this spring?

Mr. MALANCHUK. No, I have not. In the 1985 assessment that we are preparing, the case studies and so forth that have been conducted have not included any areas or any case studies in the West.

Senator HART. Why not?

Mr. MALANCHUK. As I said earlier in my testimony, it seems that the priority has been given to areas where there are sensitive resources and deposition levels are at their highest.

Senator HART. Who makes that decision?

Mr. MALANCHUK. It wasn't I; I can assure you of that.

Senator HART. I'm not pointing any fingers, I'm trying to find out who decides where research is conducted.

Mr. MALANCHUK. I think these things are basically policy type decisions that are made based on scientific evidence which I wasn't really a party of.

Senator HART. That tells me how it was made. Who made it?

Mr. MALANCHUK. The policy offices within EPA in conjunction with the research scientists within EPA.

Senator HART. In Washington?

Mr. MALANCHUK. In Washington, but drawing on the expertise from the research labs in Corvallis and elsewhere where the research is conducted.

Senator HART. I don't mean to be tedious here, but it sounds, if I just heard you correctly, that the cat is chasing its own tail. You don't have enough research information in this region to document damage, and therefore research dollars are allocated to where there is documented damage, and so you don't have the ability to document damage here.

Mr. MALANCHUK. I understand the question. With respect to the National Surface Water Survey, for instance, it's not possible, logistically, to do the survey in the East and in the West at the same time. The decision was made to conduct the survey in the East first, followed by the western lakes survey in fiscal year 1986.

Senator HART. Why couldn't you do both?

Mr. MALANCHUK. It's a matter of being able to marshal that many helicopters and that many experienced people who are capable and qualified to do this kind of work.

Senator HART. So it's a question of resources?

Mr. MALANCHUK. Yes.

Senator HART. And the decision as to the allocation of those resources is made by the national policymakers in Washington?

Mr. MALANCHUK. I'm not sure resources is the proper word, it's a matter of logistical support, to be able to have the manpower that's qualified to conduct a survey. There's a lot of highly skilled people involved in conducting these samples and analyses.

Senator HART. Is there a shortage of those people?

Mr. MALANCHUK. It seemed at the time that it wasn't possible to be able to do the eastern lakes survey and the western lakes survey at the same time. And I'm not sure of the specific reasons why.

Senator HART. Have you requested, for this region, more research dollars or resources?

Mr. MALANCHUK. Well, again, my area is aquatics, so I am more familiar with the aquatics area. The western lakes survey is about to being. It will answer the first of our three main priorities: What is the extent of low acid, low pH resources in the western region?

Senator HART. Mr. Svoboda.

Mr. SVOBODA. I was just going to add to that, Senator Hart, that part of the reason that we formed the Western Atmospheric Deposition Task Force was to organize the various public and private agencies together to identify the research needs and priorities of the Rocky Mountain region, and, as a unified voice, take those needs to the budgetary process within our respective agencies to fund the critical research that we need out here.

So up until this point, or the very recent past, we haven't had many western voices articulating the needs of the West. Hopefully we are going to make some progress in that regard.

Senator HART. Would it help you if Members of Congress from the West let their voices be heard?

Mr. SVOBODA. I'm afraid I can't comment on that.

Senator HART. Do either of you wish to respond to Mr. Wood's suggestion that, of the $88 million in research, $87 million have gone east? Will that figure make any sense to you?

Mr. MALANCHUK. I'd be happy to furnish more information if you want it. I can say this, that in fiscal year 1985 we spent over $4 million on the western lakes survey alone. So there is some discrepancy there.

Senator HART. Now, I'm confused again. I thought you said the western lakes survey wasn't going to begin until next year.

Mr. MALANCHUK. The samples aren't going to be collected, but there is a colossal amount of planning that has gone into this.

Senator HART. When will the results of that survey be available to the Congress, or the public, or whatever?

Mr. MALANCHUK. It will be approximately a year and a half after the sampling is completed.

Senator HART. Could you or some official in the EPA provide this committee a more specific timetable?

Mr. MALANCHUK. Yes, we'd be happy to.

Senator HART. A budget and a timetable for that effort.

Mr. MALANCHUK. Be happy to.

Senator HART Is this just an aquatic survey? What about the timber, forests, agricultural damage, and the rest?

Mr. MALANCHUK. In fiscal year 1986 we are going to be starting what we call the western conifers initiative, that is part of the national research budget. That will allow us to evaluate the various terrestrial ecosystems in the West that are likely to be first affected by acidic deposition, and to take steps in developing monitoring programs to guard against any damage to them.

Senator HART. So that we will have, sometime in the next year or two, a pretty good idea of the existing, and some idea of projected damage to lakes and fisheries?

Mr. MALANCHUK. We will in one sense. The national lakes survey will be sampling over 888 lakes starting right after September 7, somewhere in that range. It will take a 6-week period of time to collect the samples. We will be sampling over 888 lakes in the West, and that's only a one-time sample. That will tell us what different kinds of lakes we have in the West in terms of their sensitivity to acid rain, and whether or not we have had any damage to systems chronically.

But we must also recognize that the lakes survey won't tell us about some of the more complicated ways that systems can be acidified, like the spring pulse. This national lakes survey will only be the beginning of our understanding of that process.

In subsequent years we will take a smaller number of the lakes and study them more intensively, but make sure that the lakes we do look at more intensively are representative of the larger population of lakes in the Western United States.

The national lakes survey is described in a bit more detail in the written record. But it is a three-phase program which won't just end in fiscal year 1986.

Senator HART. Let the committee know if resources are proscribing your ability to find out what you think you need to know to advise the Congress on what policy steps ought to be taken to correct existing damage or prevent future damage.

What I am getting at is this: I would hate to have a situation occur where you went through this survey and we had a hearing a couple of years from now and either you or somebody in your posi-

tion said, "I can't answer that question because we didn't look into that." Obviously, you can't answer every question or be prepared to, but I'm talking about the serious issues.

So what I am saying is, if you think the planned survey needs to be expanded, this committee would like to know that. We don't want to find out after the fact that you didn't have the tools and the resources necessary to do what needs to be done for the policymakers to make policy. Do you understand what I am saying?

Mr. MALANCHUK. Yes. We will do that.

Senator HART. And that could either come from you or from your superiors in Washington, either way. I'm not trying to get you into any hot water.

All right, thank you very much. We appreciate your testimony.

Mr. MALANCHUK. Thank you.

Senator HART. Now, we have heard from a wide variety of elected officials and public witnesses. We have four excellent panels, one representing additional Federal agencies, which we will hear from next; another from two representatives of the business community, well established and well known; and then two panels covering the environmental and citizen community. And, as with the other witnesses, we have asked each of these witnesses to summarize, to present whatever testimony they wish in writing, but to seek to summarize it as succinctly as possible in about 5 minutes. We've moving along at a good rate, and we are receiving a lot of helpful information.

So if the witnesses would meet that 5-minute deadline, or close to it, we would certainly appreciate it.

The first panel will consist of Mr. Douglas Fox from the U.S. Forest Service, Rocky Mountain Forest and Range Experimental Station; Mr. Jim Gibson, National Resource Ecology Laboratory from Colorado State University; and Mr. John Turk, from the U.S. Geological Survey in Denver.

If those individuals would come forward, or whoever may be representing them. I would ask that a fourth witness join this panel, if we could, and that's Miss Chris Innes, who is presenting testimony from Dr. John Harte of the University of California Berkeley Lab.

We will take testimony in the order of the names which I called out. First of all, Mr. Douglas Fox from the U.S. Forest Service.

STATEMENT OF DOUGLAS G. FOX, CHIEF METEOROLOGIST, ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION, U.S. FOREST SERVICE

Mr. Fox. Thank you, Senator Hart.

First, let me add a personal note of appreciation for the opportunity to speak here, and also to work with you again.

You may recall that I chaired the Dispersion Modeling Panel of the National Commission on Air Quality that you chaired a few years back, so it's good to see you again.

Senator HART. It's good to see you, and you did excellent work then, and I'm looking forward to your testimony.

Mr. Fox. Thank you, sir.

Since September of this year I have been responsible for a new research program at the Rocky Mountain Station in Fort Collins,

CO, related to studying the effects of atmospheric deposition on alpine and subalpine natural ecosystems in the mountain West.

Since my prepared testimony is rather lengthy, I would like to try to summarize it by raising five points for you here.

First, on the current deposition levels that are occurring in Colorado and the mountain West.

Data suggests that about 1 milligram per liter of sulfate, and eight-tenths of a milligram per liter of nitrate, are contained in precipitation falling in Colorado now. Eastern values range from 2 to 3 milligrams per liter for sulfate and roughly 1 to 2 for nitrate. At the same time, clean Pacific air mass values range from about 0.3 for sulfate and 0.1 for nitrate.

The point being that concentrations of pollutants in precipitation in Colorado are somewhere between the high values in the East and pristine values that we measure in other parts of the world.

A point I want to make about this information is that we are not talking about deposition numbers per se, deposition to ecosystems. That we really are not able to measure at the present time, because of some problems with attempting to measure what we call dry deposition, that amount of material that falls out of the atmosphere without precipitation. We really have very little information about the precise process by which deposition is uptaken in snow, and therefore any measurements in snow are subject to uncertainty.

And finally, we have no measurements at the present time of cloud and fog interception, which appears to be an important contribution. These, by the way, are areas that our new research project will be focusing on.

Furthermore, there is a measurement bias to low elevations, and there is also a bias to the nature of the collection used.

The bottom line here is that at the present time I don't feel we can quantify deposition to the ecosystem.

My second point relates to the modeling related to the source and receptor relationship. In other words, where is the deposition coming from. Well, most likely, as we have heard earlier today, deposition is coming from a mixture of close-in local sources and longer ranges of transport.

I think in fairness to the folks who have testified here before, it really is very difficult to establish with simply measurements what the deposition mix is from long distance and local sources. Therefore, it is necessary to use air quality models, and as you well know, these are very uncertain tools at the present time. Models appear to have some skill in predicting general impacts from year to year, but I think they show very little skill in specific situations.

Two points regarding modeling I would like to make are, first, that the models are only as good as the data they use, and we need to have better meteorological data to characterize the three-dimensional and time-varying structures of the western atmosphere.

The second point, we need to have a consensus model developed for applications, particularly to PSD, in the Western United States.

My third point relates to the resources at risk. And yes indeed, alpine lakes, mostly located in the wilderness areas in national parks, are very sensitive to acid deposition where sensitivity is de-

fined as the likelihood of a change resulting from the deposition of atmospheric chemicals.

Unfortunately, the biological consequences of sensitivity, or the sensitivity of organisms, are not really quantified. We do know that there are certain effects on individual organisms. There are effects at low pH that lead to killing fish, for example. But we don't have information for most organisms that habitate the alpine. This, again, is the thrust of our research.

Developing dose and response information and putting the data into its proper ecological context for things like lichen, moss, phytoplankton, zooplankton, and soil micro-organisms is work that we are engaged in.

I wish to emphasize here that this work is of a long-term and complex nature, that we will not have any immediate answers probably to some of these questions, and only by continued research over a period of time are we likely to make very much progress.

My fourth point relates to the PSD process and whether PSD is sufficient, and whether we have the tools to be able to protect wilderness using PSD.

As you know, wilderness protection is extended to all air quality related values. The current policy that the Forest Service follows in the absence of better information is to err on the side of protection by recommending to regulatory agencies that any measurable change will be unacceptable. Let me explain that what I mean here is that if a source projects an impact, we will accept and approve and recommend the issuance of a PSD permit only if it can be shown that that source will not cause a measurable change in the ecosystem unless the proponent can show and provide us data to the contrary.

Since modeling is a key to all this, it's all done before the fact, we need agreement between Federal land managers, the various States involved and the EPA on an appropriate modeling approach.

Finally, I'd like to conclude with simply a statement that we have established a new research unit, this unit is under the auspices of the National Acid Precipitation Assessment Program; that we are working very closely with the EPA and the other Federal agencies here in the development of a somewhat larger research and monitoring plant for the Western United States.

At this point I'll be pleased to answer any questions you might have.

Senator HART. Thank you very much, Mr. Fox. I do have a couple of questions. What I think we will do is go through all the statements and then I'll come back and direct questions to all of you.

Mr. Jim Gibson, National Resource Ecology Laboratory at Colorado State University.

STATEMENT OF JAMES H. GIBSON, COORDINATOR, NATIONAL ATMOSPHERIC DEPOSITION PROGRAM, COLORADO STATE UNIVERSITY

Mr. GIBSON. Thank you, Mr. Chairman. It's a long title.

I'm Jim Gibson from the Colorado State University. I have been actually involved in the so-called acid rain program since about 1978 when a group of us, actually through the State agricultural experiment stations, were instrumental in initiating a monitoring program in this country—that's deposition monitoring, or as it was termed in those days, acid rain monitoring.

This National Atmospheric Deposition Program is now the Federal program under NAPAP, and I am responsible for managing the Federal NAPAP, so-called National Trends Network, as well.

There has been some discussion of the question of monitoring. We have about 200 stations nationally now, and about 55 of those stations exist in the States up and down the Rocky Mountains and West.

Dr. Fox has made many of the comments that I could well make, so I think I will deviate from what I planned to say a moment and discuss a little bit about the issue of damage, adverse effect, change, air pollution, et cetera.

I think one of the problems that has existed is that we did call this the acid rain program initially. In our own efforts back in 1978 we argued this issue, and we called our own program then the National Atmospheric Deposition Program, recognizing the fact that we are dealing with air pollution, and that many of the effects that have been pointed out are not solely due to acid rain or due to acid deposition but are combination effects due to a degradation of air quality. And I was pleased to hear you use the term "air pollution" in your initial comments.

Now, a question has been raised concerning whether or not we have damage in the Rocky Mountain region. I think the terms damage, adverse effect and change have not been very well defined.

If you look at the question of air pollution alone, I think that one could suggest that there is some evidence, although there hasn't been a great deal of research effort in this area, but there is some evidence of adverse impacts of air pollution around urban areas. A lot of this may well be due to ozone and not acid rain per se.

But I would agree with Dr. Malanchuk's comment earlier that we do not have any documented damage due to acid rain in the Rocky Mountain West. Even though there have been some reports, I would suggest that these can probably be explained by natural variability, which is one of the areas that needs to be given considerable attention in future research out here. In other words, what is natural variability? This has been a limiting factor in our ability, even in the Eastern United States, to understand the impacts of acid deposition, or atmospheric deposition, simply because we have been unable to sort out natural variability, which is certainly a major factor.

So I guess my feeling is, in my testimony that I presented to you in writing, I suggest that yes, in the Western United States, while we don't have documented damage today, as has already been pointed out we have very sensitive ecosystems, we have deposition levels which are lower than but still beginning to approach those of the Eastern United States where damage has been seen; and that we need to institute research programs in the West which will recognize—one is that we are not looking currently for a problem, we're looking to prevent the problem.

One of the points that Dr. Fox made in his comments that I think is particularly important is that we don't currently know enough about high elevations. We do know that high elevations are receiving precipitation well above those areas where we currently are doing our research and monitoring, and one of the major research issues in the future is going to be the question of high elevation because this is where we have the least information and the most sensitive systems.

So, with that I will close my remarks.

Senator HART. Thank you very much, Mr. Gibson. We will come back for a couple of questions.

Mr. John Turk from the U.S. Geological Survey in Denver. Mr. Turk.

STATEMENT OF JOHN T. TURK, RESEARCH HYDROLOGIST, U.S. GEOLOGICAL SURVEY

Mr. TURK. Senator Hart, I appreciate the opportunity to testify before this committee.

Basically what I'd like to say here is that I'm going to base my testimony on my professional interpretation of where the scientific community stands in terms of being able to document, with some scientific certainty, the extent of acid rain damage or changes in precipitation chemistry other than acid rain that may be of concern in this region.

To clarify scientific proof or scientific evidence, I think it is worthwhile pointing out that it is always possible to find a set of data which can be interpreted one way, and as scientists we generally consider we can provide the best input to decisionmakers such as yourself by eliminating as many of the alternative hypotheses as possible. And that is where much of the uncertainty remains right now. There are some indications that we could have small amounts of acid rain falling throughout the West. It's difficult to pin down the effects on these things, however.

Most of the testimony I will provide is summarized in two reports, one "An Evaluation of Trends in the Acidity of Precipitation and the Related Acidification of Surface Water in North America," which I authored, and you have a copy of there; and also, "The American West's Acid Rain Test," by Roth and others, which I believe you also have a copy of.

The testimony is going to hit on basically three points: one, the sensitivity of western aquatic systems to acid rain damage; secondly, what the precipitation within the West looks like; and thirdly, any aquatic effects that have been documented to occur as a result of precipitation, acidity, or other chemistry, from precipitation.

On the question of sensitivity, I think there is relatively little scientific doubt. I think we are quite agreed throughout most of the community on this, based on studies in the Sierra Nevada, the Cascades, the Rocky Mountain system from the north pretty much to the south, more recent work in the Flat Tops, Mount Zirkel, Weminuche wilderness areas in Colorado, that Colorado and indeed much of the rest of the Western United States has aquatic systems, lakes, streams, which are as sensitive as any that you are likely to find anywhere in the world.

This sensitivity means that, given the proper amount of acid from rainfall or any other source, these systems could become acidified to levels which would be harmful to the fish, salamanders, et cetera, that live in them, and present a real problem to their functioning as ecological systems.

As was stated earlier, I believe by Mr. Malanchuk, most of the work has been so far on these sensitive systems and trying to detail whether or not there have been impacts, has been pretty much done on a localized basis.

I am pleased to say that the creation of the Western Atmospheric Deposition Task Force and the recent meeting in Colorado Springs sponsored by that organization and the National Acid Precipitation Assessment Program are necessary beginning first steps in coordinating these individual studies, so that I believe we will have in the very near future comparable data bases, collected not only by individual researchers but also by national programs such as the ones that Mr. Malanchuk referred to.

As far as changes in the acidity of precipitation, there certainly is some evidence that downwind from local metropolitan areas, I would say in particular the Los Angeles Basin, San Francisco Bay area, Puget Sound area, the Denver urban corridor area, that there have been changes in the precipitation chemistry that are consistent with that chemistry having become acidified.

The basis for this primarily goes to two things, one, correlations between the actual acidity of the precipitation in these areas downwind from metropolitan areas with acidic-forming substances such as sulfur, nitrogen oxides, from the areas. The correlation between those precursors of acidity and the acidity in the precipitation certainly indicate these major metropolitan areas probably are acidifying the rainfall and snowfall downwind from them.

Also, if you compare the actual acidity of the precipitation in these areas to the acidity both calculated from various theoretical approaches and the acidity measured in very, very remote parts of the world away from local sources of pollution, there is more acidity in these particular areas.

Right now there does not seem to be convincing evidence, at least to me, that these types of sources, these large metropolitan areas, perhaps also smelters, et cetera, have merged into what I would call a regionally acidified precipitation phenomenon.

That's not to say that could not occur in the future or that we should not be aware of the potential for the problem, but at this stage it does not seem to be the same type of a problem on a regional basis that we have in the Northeastern United States.

As far as the actual acidification of aquatic systems, the lakes, and streams, there is again evidence from systems downwind from these major metropolitan areas—I would say in particular a couple of reservoirs downwind from the San Francisco Bay area, the Como Creek area, downwind from the Denver urban corridor—that changes in alkalinity or ability of these systems to withstand acid attacks have decreased, these alkalinities have decreased pretty much in the amount that you would expect based on the acidity of the precipitation that might have acidified them.

Also, there are some fairly good correlations, in at least the Como Creek case, of changes in the alkalinity of Como Creek, re-

sponding in a pretty much one-for-one response, dose response relationship, to the acidity of the precipitation fall on that watershed.

So that we think that we do have some chemical responses of systems, things that are measurable chemically, to indicate that the chemistry of these systems is changing with response to changes in the acidity of the precipitation.

I would have to agree with Dr. Gibson that as far as biological damage within these systems, right now we do not have any what I would call scientifically convincing proof of biological damage.

There certainly is the possibility that something is going on that we are not aware of. We would certainly hope that within the next couple of years with these more coordinated efforts that we would be able to rule out other possibilities for, for example, lack of spawning in salamanders in one case, perhaps some lack of spawning success in trout in some other cases.

But these biological systems in particular can respond to a number of stresses on them, things varying from differences in temperature of the water all the way up through acidification of the system.

So these damages to the biological systems do not really appear to be documented very well right now.

In terms of, I would say, the claims for temporary acidification which have come to light in the report by Roth and others, there is some question in my mind as to whether this temporary acidification is the result of actual acidification of the lake system even on a temporary basis, or the simple physical replacement of a more alkaline lake water with the more dilute or less alkaline snowmelt, something that does not necessarily correspond to acidification at all, something that even in the complete absence of any acidification of the snowpack or the precipitation would be expected to have been going on ever since these lakes were created.

I think a better interpretation of the data, a more thorough interpretation of the data, will allow us to assign how much of this is due to actual acidification and how much of it is simple replacement of alkaline water with more dilute water on a temporary and totally natural basis.

In terms of more recent data which have come to light, looking at the question of regional acidification of surface water systems, the lakes, and streams, work in the Mount Zirkel, Weminuche, and Flat Tops wilderness areas indicates similar sulfate concentrations in these lakes, even though they differ greatly in their proximity to proposed regionally important sources such as, for example, the generating and smelting capacity which is present in four corners and other areas to the southwest of us. We would expect, if these were very, very important regional sources, that, for example, the lakes in the Weminuche or San Juan Mountains area would be much higher in sulfate than those that are quite farther downwind, such as the Flat Tops and Mount Zirkel areas more toward the Wyoming border.

We do not see this regional gradation in sulfate chemistry, and right now I would say that it lends fairly strong support to the contention that, at least as far as sulfate acidification is concerned, that we do not have regional acidification of surface water systems due to sulfate.

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Because of the complexities of nitrogen chemistry and nitrogen oxide emissions, their uptakes within watersheds, we cannot make this same statement with respect to acidification due to nitrogen sources.

So, in summary, I do believe we have cause for concern to further monitor and consider in our regulatory processes with respect to new emission sources, we need to consider the possibility for future acid rain and related impacts on aquatic systems. At this time, however, it looks like the only convincing evidence for even chemically detectable effects as opposed to biological damage are located relatively close to readily identifiable sources, these being primarily the major metropolitan areas within the Western United States.

This concludes my statement. I will be happy to answer any questions.

Senator HART. Thank you very much, Mr. Turk. That was a very fine statement.

The fourth panelist is Ms. Chris Innes, who is representing Dr. John Harte from the University of California, Berkeley. Miss Innes, pleased to have you here.

STATEMENT OF CHRIS INNES, REPRESENTING JOHN HARTE, PROFESSOR OF ENERGY AND RESOURCES, UNIVERSITY OF CALIFORNIA

Ms. INNES. Thank you. Dr. Harte is sorry that he is unable to attend himself.

As an atmospheric scientist, I have some familiarity with Dr. Harte's work, and he has asked me to present his testimony today.

Dr. Harte is professor of energy and resources at the University of California, Berkeley, and he is a senior researcher at the Rocky Mountain Biological Laboratory near Gothic, CO.

What I would like to do is read verbatim from the text that Dr. Harte has prepared for you today.

Beginning in 1980, I have led an intensive research program at the Rocky Mountain Biological Laboratory on acid deposition and its effects. The research site is in the Nature Conservancy's Mexican Cut Research Preserve, a watershed in Gunnison County, CO. The major results of our research are as follows:

No. 1. Acid deposition is occurring. Mean annual volume-weighted rain pH ranges from 4.5 to 4.7 each year and mean annual snow pH is typically about 5.1. The acidity is due in roughly equal measure to sulfuric and nitric acid. The higher pH of the winter snow is due to the dilution effect of a greater precipitation volume rather than to a lessening of pollution in wintertime. No distinct trend in annually-averaged precipitation pH has been observed over the monitoring period.

No. 2. Very sensitive aquatic ecosystems occur within the study site; 15 lakes and ponds within the watershed have been closely monitored over the past 5 years; 6 of them are highly sensitive to acidification, with maximum alkalinity less thatn 60 microequivalents per liter. Within their drainages, steep mountain slopes, thin soil development, and the absence of carbonate-bearing rock contribute to the sensitivity of these sites. No distinct trend in annual-

ly averaged surface water alkalinity has been observed over the past 6 years.

No. 3. During the period of most intense snowmelt at the site—typically in late May or June—the pH's of the surface waters of some of the more sensitive lakes and ponds have been observed to be reduced to approximately 5. The possibility that this is simply a dilution effect that could result from the melting of pure snow can be ruled out by the fact that a sharp increase in the sulfate ion concentration of the surface waters accompanies the pH reduction. This temporary acidification phenomenon only lasts for a week or two and only affects the surface waters, but it occurs during the acid-sensitive reproductive stage in the life cycle of many aquatic organisms and at the littoral zone in the lake where biological activity is most intense.

No. 4. A number of biological populations known to be very sensitive to acidity occur within the watershed. These include the trout *Salmo clarki* and salamander *Ambystoma tigrinum.* A significant decline in both the population and the reproductive success of this salamander has been observed over the past 5 years. The largest declines have been observed in the ponds that are most acid sensitive, but no causal relation between acid deposition and the population decline has been established yet.

No. 5. If present levels of acid deposition continue, then over time the resistance to acidity of the surface waters at our research site will decline and the temporary acidification phenomenon will intensify. Determination of the rate at which this process will occur is one focus of our current research.

No. 6. Based on our present understanding of emissions, atmospheric pathways, and the chemical composition of the precipitation at our site, our best guess is that metal smelters, fossil-fuel-powered electric generating plants, and mobile sources all contribute significantly to the acid deposition at the site.

Our findings have been placed within the larger context of acid deposition in the Western United States in a report I coauthored, The American West's acid rain test, that was sponsored by the World Resources Institute in Washington, DC. That report emphasizes the tremendous opportunity we have in the Western United States to act rationally and responsibly to prevent extensive acid deposition damage from occurring. Additional research is needed, particularly to assess the long-term prospects for acid deposition damage to both aquatic and terrestrial life in the West, but there is also a need to take actions that will reduce over time the emissions of acid-forming pollutants. As noted in the World Resources Institute report, such actions should include the following:

No. 1. The development by the U.S. Department of Energy and the Congress of a vigorous and effective policy to promote energy conservation and the use of renewable energy resources.

No. 2. The formulation by the USEPA of a comprehensive transportation strategy that will reduce NO_x emissions from vehicles.

No. 3. The denial by Congress of an extension beyond the 1987 expiration date of the nonferrous smelter order that exempts copper smelters in Arizona from the Clean Air Act requirements, and the establishment of an agreement with Mexico to prevent serious air quality degradation from new smelter facilities.

No. 4. The inclusion of acid deposition in the siting criteria used by State and Federal air pollution control agencies for new industrial facilities, and an assessment by the USEPA of needed control measures on existing powerplants.

Finally, I wish to emphasize that acid deposition is only one of the many hazards associated with inadequately controlled emissions of air pollutants, and thus there are a multiplicity of benefits associated with an effective cleanup program. These benefits include a reduction of the health hazards in our cities, a reduction of visibility impairment in remote areas, and a reduction of the risk to mountain lakes and forests that are part of the life support system that sustains our economic vitality in the Western United States.

Thank you. That concludes his testimony.

Senator HART. Ms. Innes, thank you very much. We appreciate your presence and for reading Dr. Harte's testimony.

I'd like to ask each of you a few questions, and the rule will be that if any of you wish to comment on anyone else's answer or on that question or anyone else's testimony, just jump in and feel free to do so.

Dr. Fox, would you repeat a sentence in the first paragraph or two of your testimony which I think summarized your general impression or your general conclusion that the acid rain situation in the West was somewhere between the values of the Northeast and some pristine standard. Do you know that sentence that I am referring to?

Mr. FOX. Yes; do you mean in the formal testimony, sir?

Senator HART. The testimony that you delivered, and I think it is in your statement.

Mr. FOX. Well, it's in both places.

Senator HART. If you would just repeat that one sentence.

Mr. FOX. I think what I said, I provided some numbers on the deposition levels, and then I believe what I said is that we know that the amount of pollutants in the area and precipitation in Colorado is not at the level that it is in the Eastern States, but it's also not at the level that it is in very clean environments, measured in places like Hawaii and the extreme west coast of the United States.

Senator HART. Well, if that's the spectrum, that the Northeast is the worst case, if you will, and pristine areas where there is virtually no acid rain the other end of the spectrum, could you estimate where along that spectrum our general situation in the Rocky Mountain West falls? Halfway in between, or where?

Mr. FOX. Well, I can provide some statistics in terms of the percentages. Roughly, we are at about a half to a third the amount of deposition that is occurring in the East, and at the same time about three times the amount of deposition that is occurring in pristine areas. That's for sulfur pollutants.

For nitrogen pollutants, we are probably greater than a half, somewhere between a half and three-quarters of the levels that are occurring in the East are occurring out here right now; and that's a factor of 10 higher than would occur in a pristine situation.

So, sulfur we have about a third the concentration that's occurring in the East; in nitrogen we have about 70 percent of the depo-

sition that's occurring in the East. But that in a region where generally the ecosystem is more vulnerable.

Yes; I think it's clear that, at least in the alpine, the presence of the poorly buffered lakes, lack of soil development, and all those factors, lead to what one would say would be a more vulnerable system; yes, sir.

Senator HART. Mr. Gibson.

Mr. GIBSON. Yes; I'd like to comment on what Dr. Fox just said. I think you were speaking in terms of concentrations.

Senator HART. Yes.

Mr. GIBSON. I have some numbers. I'm not going to give you units, because they confuse people—and this is in my written testimony—just to give you an idea. One of the cleanest sites we have in this country is Olympic National Park. We'll say the sulfate there is 5. And the Rocky Mountain region averaged over New Mexico, Colorado, Wyoming, and Montana is about 17, which is that 3 or 4 range that he was mentioning. And I'd have to pick a site in Ohio which is indicative of that region, which is about 63. So you have a ratio of 5 on the west coast, 17 in the Rocky Mountains, and 63.

Now that deposition depends on how much rainfall we have. So if we look at those numbers in terms of rainfall, we get a somewhat different picture. In other words, we have less rainfall out here, so we would expect less deposition even with the same concentration. So if we look at the Rocky Mountain region, the deposition—and I will put this on a scale that is frequently used, kilograms per hectare—the deposition is 4. In the Ohio area it is about 31.

So if we look at deposition because they have more rainfall they have more deposition. Here we are dealing with a factor of 7 to 8.

To give you some idea of what the significance of that is, it has been estimated by work done in Norway, Sweden, Canada, and the Eastern United States, that when you reach somewhere between 15 and 20 kilograms per hectare, you are reaching a region where you can expect damage in the most sensitive systems.

Now, that 4 that we see out here does not take into consideration the fact that we don't have very good measurements, as I mentioned earlier, from the high elevations. I'm guessing in the high elevations we may be a factor of 2 or 3 above that. In other words, if we were measuring this precipitation at the tops of the Rockies, it probably could well be anywhere from 8 to 12 on that same scale, rather than 4. So while we are still below that 15 to 20 threshold, we may be at our high elevations approaching that threshold. And, of course, as several people mentioned, that is where the sensitive systems are.

Senator HART. Do either of the three of you wish to respond to or quarrel with or differentiate yourselves from the conclusions presented based upon the data in Dr. Harte's studies? Mr. Turk.

Mr. TURK. I don't know that I would necessarily like to differ with him. I guess, having talked with Charles Blanchard, who works with Dr. Harte and was the coauthor on the report by Roth and others that John Harte was also an author on, we discussed how best to compare the data they had to see whether or not acidification versus dilution was the more likely cause of the decreases in alkalinity seen at the biological station.

The comparison of sulfate values before and after snowmelt would seem to me to be an inappropriate comparison to make. In most lake systems I would expect these to not change at all, that sulfate would pretty much stay the same in the lake before and after snowmelt, and that all the sulfate in the lake there originally probably came from snowmelt from the previous year and would have relatively little opportunity to change.

Perhaps in this particular case a phenomenon known as sulfate reduction, where the sulfur is essentially taken up in mud and changed to a form of sulfide, the thing that gives rotten eggs their odor, this may have caused a decrease in sulfate in the period between the previous snowmelt and the subsequent snowmelt. In most systems, however, this would have no effect other than to temporarily increase the alkalinity in the period between the snowmelts.

The most appropriate comparison to make would be between the acidity in the snowmelt and the decrease observed in the alkalinity.

Based on other studies throughout Colorado, we would expect the acidity in the snowmelt to be somewhere on the order of 10 units expressed as microequivalents per liter of acidity. If, as reported here, the decrease in alkalinity was somewhere on the order of, I take it, around 50 or 60 microequivalents per liter, it would seem that there would not be enough acidity around to cause—or equate to that large a decrease in alkalinity. I would think that would be the most appropriate comparison to make, though.

Senator HART. I am sure most other lay persons are struggling to sort through the specific data. Am I correct in concluding that Dr. Harte's data and conclusions are somewhat more serious, than the three of you have concluded? That is, present levels of both concentration deposition and possible damage. And if that's a proper conclusion, what does he know that you don't know?

Mr. FOX. To try and answer that. As Dr. Turk pointed out, I think again it's a question of how responsible scientists discuss with one another the significance of their conclusions.

I would say about the only point that Harte has made that represents anything really different from what the others of us have found, and discussed, and studied in some detail regards the biological systems, and he made a point to say that he has observed a decrease in salamander populations in some of the lakes that are more prone to acidification than at lower alkalinities.

I think it is responsibly reported, inasmuch as Dr. Harte has attempted to describe a cause and effect relationship. They are simply making an observation. We would like to see, and we are in fact doing a lot of observing this summer, to try and find if we can't document those kinds of reductions and try and learn something about why they occur.

At the present time I think it's very unsafe to conclude that if there is a reduction there is any suggestion that that is related to atmospheric deposition.

Mr. GIBSON. I am reminded of Thoreau's definition of circumstantial evidence. He said that's finding a trout in the milk. I wonder if the same might not be the case here.

The point is, if you begin to find living things dying more than they should, or the population diminished more than you can account for otherwise, can't you draw some circumstantial conclusions?

Mr. TURK. My response to that basically is that we consider this evidence and other evidence that has been presented, both on the acidification of precipitation, things that basically are directing the studies that are going on now. I think that John Harte is somewhat reluctant to describe the decrease in numbers of salamanders to the effects of acid rain or acidification of his aquatic systems up there. He considers it to be sufficient justification to do additional work on trying to ascribe a causal relationship.

I basically second this. It's the way scientists are supposed to operate. When scientists stop behaving as scientists and start behaving as advocates, then we do a disservice to ourselves within the scientific community and to the people who depend upon our answers to best guide them in terms of making policy decisions.

So I think these findings are being taken seriously. But on the other hand, I would not advise, from my professional standpoint, taking them as evidence of a causal relationship.

But I think that is basically where we stand right now. We have certainly cause to look at a number of systems, in a scientifically justifiable manner. We do not have cause to say that we have a very large problem throughout the West right now.

Mr. GIBSON. I would like to second, I think, everything that has been said on this issue, and just comment that if you look at the history of the effort in the Eastern United States you will find that many of the so-called impacts, effects that were suggested as being related to acid rain, disappeared from the information that is currently being presented today. And yet there we have dealt with a situation in which research has been going on for a number of years. So here I think it is not at all surprising that, as Dr. Turk has suggested, as scientists point out these things, they are observations they have made, but that does not constitute a cause-and-effect relationship.

And if you look at the early work in the Adirondack Mountains and lakes there, the so-called ILWAS studies, there is still controversy over whether or not they have been able to establish a cause-and-effect relationship.

These systems are not simple. As I mentioned earlier, natural variability is something that people have begun to take very seriously. Natural variability can be very large. And there have been many instances of that as causing effects that have been described as other factors.

So I think I would agree with John that this is reason for continued effort, reason for research, but I think we have a lot yet to understand.

Senator HART. Well, that seems to be the hallmark of most of the testimony we have heard from the scientific community so far, is what we don't know. It's not how much we know, but what we don't know. How long is it going to take to find it out?

I think you and Mr. Turk have given a very concise statement about the role of the scientist, if you will, and the caution, even

conservatism, that the scientific community has to exercise in these areas.

On the other hand, public interest, often the public health, dictates that the people of the country don't want something bad to happen, and then have to figure out how to fix it. So those of us who represent the public interest are in the position of having to possibly defend that public interest and public health even before the scientific case is all in.

So let me ask you what I would consider to be the $64 question. Is it possible that damage could be done to water systems, aquatic systems, forest or vegetation systems, or other ecosystems, that would not be documented scientifically before it became very expensive to clean up or the damage was irretrievable?

Do you see what I am saying? What are the chances of that?

Mr. TURK. My best guess—and scientists like to talk about hypotheses, but it's really a word that equates to best guess more than anything else—my best guess is that how best to handle this situation is to apply the PSD requirements that we have now to new sources. I don't think, based on what I have seen both in the literature from work done by others in this region and in the work that we have done in this region, I do not think that we are likely to have a cumulative effect with the present level of emissions that is going to change the nature of the effects, either on the chemistry or the biology of the lake systems and stream systems that we are looking at. I'm not, certainly, prepared to address the terrestrial plant situation. Perhaps someone else could handle that.

But certainly, if additional sources are to come on line, either in this country or in others as we have heard earlier, the predictive modeling tools to look at changes in the amount of acidity that is going to be deposited and the prediction of what that is going to do to the alkalinity, pH, and therefrom the aquatic biology of those systems, I think that's an appropriate way to handle the systems that we have jurisdiction over. I'm not exactly sure how we can handle an international situation such as the smelters in Mexico that have been alluded to.

But I think that we definitely have the opportunity to address new sources, changes in current emission levels for existing sources, and prevent any significant damage to aquatic systems in the West.

Senator HART. So a prudent course for the policymaker might be, just for the layperson in this audience or beyond, PSD is a shorthand for prevention of significant deterioration, a standard established, I guess, in the original clean air laws in the 1960's and 1970's, which as Mr. Turk has just suggested build into the system of licensing and so forth conditions against increased pollution.

So your suggestion to someone like myself or the Congress at large would be to apply that standard in the West to prevent the situation from occurring which I described, namely, irretrievable damage or damage very expensive to reverse?

Mr. TURK. Yes; I think that if the PSD process is applied conscientiously by industry and the regulatory authorities, and in conjunction with continued monitoring of these sensitive systems, that we can refine our models as we go along and perhaps continue to use this one process for quite a while.

In the future it might become necessary to do something else, but for the foreseeable future I would be comfortable with that process.

Senator HART. One final bureaucratic question, particularly for the three gentlemen, each representing a public or quasi-public agency.

Are you or your agencies members of the EPA task force? Are you individually, or are your agencies represented on that task force?

Mr. TURK. Yes, all three of us.

Mr. GIBSON. Which task force is that, the local, the western?

Senator HART. Yes, region VIII.

Mr. TURK. Yes.

Senator HART. So what you have said here today is information available to the EPA, in effect? I mean, you are sharing all of this?

One of the things I am sure the taxpayers will want to know is, is the Forest Service going in one direction and the Geological Survey in another and the laboratory somewhere else, and the EPA an independent course?

All public agencies are cooperating in terms of studies and data collection and sharing and so on? Is that generally an agreeable proposition?

Mr. FOX. I'd say it's rather an example for the way the bureaucracy ought to work. The western atmospheric deposition task force, under John Wells' leadership, has been a remarkable opportunity for us to communicate and share our information.

Senator HART. I'm glad to hear that. Obviously, none of us would want to learn 1 year, or 2, or 5 from now that the Forest Service knew something that the EPA didn't, or vice versa, or whatever.

Thank you all very much for being here. Miss Innes, thank you. I appreciate your testimony.

Our next panel is two representatives from the private sector and business community, Mr. Bruce Rockwell and Mr. Harry Storey.

Mr. Rockwell is here representing the Western Regional Council, and particularly its Clean Air Committee.

Mr. Storey is present from Alliance for Clean Energy.

We welcome both of you. You both are leading citizens in our community.

Mr. Rockwell particularly, I know, has been very active in translating economic concerns in the West to most of us not only from the West, but in Congress, in trying to seek the reasonable balance between protection of a clean environment and economic opportunity.

Mr. Rockwell, if you would begin, and then we will hear from Mr. Storey.

Thank you both for being here.

STATEMENT OF BRUCE ROCKWELL, WESTERN REGIONAL COUNCIL

Mr. ROCKWELL. Thank you very much, Senator Hart.

We are very much pleased to have an opportunity to appear here before this hearing today.

My name is Bruce Rockwell. I am chairman of the board of the Colorado National Bank.

I am a third generation Coloradoan. I grew up in these mountains of ours and love them deeply, and nothing is more important to me and my family than protecting the environmental integrity of this marvelous state of ours.

I am here today on behalf of the Western Regional Council. We have a rather extended position paper which we ask be entered into the record.

Senator HART. Without objection, it will be received.

Mr. ROCKWELL. And I will do my best to summarize our position.

The Western Regional Council is an organization of 43 companies engaged in a variety of business activities in the West, including financial, mining, utility, transportation, energy, and other enterprises.

One of the primary purposes of the council is to establish a balanced viewpoint between the need for a safe and clean environment in which to live, and the need for a healthy, active economy in our region.

Although, as we have been hearing today, there are many questions that remain about the causes and effect of acid rain, Congress is being urged to consider acid rain control legislation.

In the absence of complete and adequate scientific data, some proposals go beyond the environmental goal of reducing acid rain and its effects, and would unnecessarily negatively impact the West.

For this reason, and because we in WRC both live and work here, we are active participants in the western acid rain issue.

Before summarizing our specific conclusions and recommendations, I would like to express a concern that too much of the acid rain debate in the West is driven by allegations, private agendas, and inaccurate summary statements, or preordained conclusions.

It is our desire that the debate focus, instead, on the actual research, facts, and scientific evidence.

For this reason we are pleased that you have had these distinguished scientists appear here before us today, and we have listened very carefully to their testimony.

While I am not a scientist, let me offer some important facts that warrant some consideration.

First, much of the intention of Congress and the current research efforts regarding acid rain focuses on sulfur emissions.

The fact is that, under the present Clean Air Act, manmade sulfur emissions in the 11 Western States are actually lower than they were 35 years ago.

Considering the remarkable growth that has occurred in the West since 1950, it seems to me that that's a major achievement.

But that's not the only good news.

Under the present law, and in light of recent events, sulfur emissions between now and the year 2000 are expected to decrease even further in the West.

That's under the current Clean Air Act.

Why are sulfur emissions in the West lower today than they were in 1950?

First, the installation of constant emission controls on copper smelters, and we have been hearing something about that.

During the past 15 years that industry has spent nearly $2 billion on air pollution controls.

I would be glad to respond to some of the specific questions, perhaps concerning the border copper smelters.

Second, coal-burning powerplants in the 11 Western States account for less than 3 percent of the U.S. powerplant SO_2 emissions, primarily as the result of constant emission controls properly required by the Clean Air Act, and the burning of low-sulfur western coal, a very important aspect.

A group of 20 utilities located in the West are spending $3.5 billion by the year 1990 for air pollution controls.

Thus, we in the West already have a de facto acid rain control program in place, and it seems to be having an effect.

It has been and continues to be paid for by western consumers and business.

Perhaps that's why, to date, while acid rain research in Western States has identified some isolated surface waters as potentially sensitive, as we heard here today, I still think I'm safe in making this statement that no confirmed adverse effects attributable to acid rainfall acidity, based on documented scientific evidence, has been established in the West.

Importantly, even with higher levels of emission of past years, no significant acid rain damage occurred in the West.

Certainly we must remain vigilant, and to act responsibly on solid scientific findings.

Based on these factors and the scientific research reviewed in our written statement, the Western Regional Council advocates the following position on western acid rain:

If Congress considers legislation to improve controls to reduce acid precipitation, regional variations, and State flexibility must be taken into account.

Initial control efforts should be applied to both stationary and mobile sources in regions where significant acid precipitation problems exist or damage has occurred.

Future emission reductions should be implemented in a program of several phases and should be defined in response to research results.

Of particular importance to WRC, we feel that it is only reasonable that sources be permitted to use the most cost-effective means of emission reduction.

Mandating the use of emission control equipment, scrubbing, that is, has nothing to do with the environmental goal and actually foregoes the possibility of achieving early on SO_2 reductions.

It is also important that the cost of emission reductions not be spread beyond the source through a national tax or fee.

We oppose proposals that shift the financial burden away from the polluter, and reject the idea that the last ones to comply with the environmental safeguards, the last ones to clean up, should be compensated for their delay.

And, finally, any program of reduction should give full credit for control steps already being taken or planned under the present

law. As previously noted, we in the West have already made or planned reductions at significant cost.

We have included additional information in support for our recommendations in our full statement.

In conclusion, because of the interrelationship of air quality programs and issues, we believe that if acid rain legislation is considered in Congress it should be reviewed in concert with other provisions of the Clean Air Act. Consequently, we have included on our written statement our recommendations on such clean air issues as prevention of significant deterioration, visibility, percentage reduction requirements under the new source performance standards, fugitive dust, and so forth.

We appreciate very much, Senator, your interest in this vital question to the West, and we offer our cooperation with you and your committee, as we have in the past.

Senator HART. Thank you very much, Mr. Rockwell. Your presence here today is appreciated, as has been your continued contact and communication with the western Members of Congress and other organizations. We appreciate it.

I have some questions. I'd like to hear from Mr. Storey first, and then perhaps direct those questions to both of you. Mr. Harry Storey.

STATEMENT OF HARRY L. STOREY, ALLIANCE FOR CLEAN ENERGY

Mr. STOREY. Thank you very much, Senator Hart.

Senator Hart, I am Harry Storey, president of Storey & Associates in Denver, CO. I am appearing before you today as the president of Alliance for Clean Energy. The Alliance for Clean Energy is a coalition of coal producers, transporters, and consumers with over 35 member companies who would be directly impacted by pending acid rain legislation.

ACE membership includes most of the low-sulfur coal producers in the United States, both East and West, and ACE recognizes that acid rain is one of the most difficult issues facing the Congress and the country today. The environmental and economic consequences of legislating or not legislating a solution are enormous. Yet their remains substantial disagreement among experts about the science surrounding the cause and the effect of acid rain.

ACE does not offer judgment on the state of the acid rain, nor are we supporting any particular piece of legislation. The essence of the ACE position is that if Congress decides to enact acid rain legislation it should be the most cost effective.

To be cost effective it must permit utilities to freely make the best economic choice between burning low-sulfur coal and mandatory scrubbing.

The ACE position of freedom of choice is based on several simple but, we hope, compelling arguments. One is supply of low-sulfur coal. There are vast quantities of low-sulfur coal reserves in the United States, approximately 217 billion tons, of which 16 billion tons, 7.6 billion in the East and 8 billion in the West, are classified as current economical recoverable reserves; 65 percent of total U.S.

coal reserves are low sulfur, capable of meeting a 1.2 pound per million Btu SO_2 emissions standard without using wet scrubbers.

Current production of low-sulfur coal is approximately 300 million tons. I might add here, 200 million tons of that is produced in the East and 100 million tons of it in the West, with another 200 million tons of in-place capacity or excess capacity, if you please, in the low-sulfur coal industry. That's an ample low-sulfur coal production to meet any near term, 1985–1995 demand; 50 percent of this excess capacity, 100 million tons, would produce a reduction of current SO_2 emissions 6 to 7 million tons, which I might point out is about 60 to 65 percent of the goal that most acid rain legislation, the 25 bills that have been introduced in the 98th and 99th Congress, would require.

The cost of scrubbing versus the use of low-sulfur coal. Environmental legislation should set standards, not dictate the method of compliance. A recent Congressional Office of Technology Assessment study concluded that mandatory scrubbing would cost U.S. consumers $1.4 billion per year more than a freedom of choice, and I might add for the same environmental results.

ICF, an independent company in Washington who has done an enormous amount of work for EPA, placed the savings of a freedom of choice policy at $2 billion per year, a savings, Senator, of $20 to $30 billion over the next 15 years.

The polluter should pay. There is no equity in a national tax that would require consumers, who are currently paying for sulfur dioxide reductions in their States, to pay for sulfur dioxide emission controls in those States that have elected not to reduce their SO_2 emissions.

I might point out to you that 7 Midwestern States are currently emitting 54 percent of the total utility SO_2 emissions.

Just to point out for just a moment on what Bruce has mentioned to you, that one State, the State of Ohio, emits more SO_2 than the total 17 Western States.

Environmental legislation must not reward those who elect to be the last to comply. Many U.S. consumers, and certainly western consumers, are currently paying approximately 25 percent of their electric costs for environmental controls. We think they are paying their share.

Early reductions of SO_2 are very important if there is any basis for the concern of near-term acid rain damage, a question you addressed a few moments ago. Switching to low-sulfur coal could be accomplished in 2 or 3 years. A capital-intensive, wet, mandatory scrubbing program would take 5 to 7 years to obtain the same SO_2 reductions.

The freedom of choice policy would eliminate approximately $20 billion of front-end capital, provide additional time for new technology development, and allow in-course correction as research data becomes available and indicates a change is needed or desired.

One of the major issues in this debate, Senator, is the jobs issue. The coal mining employment in the United States has doubled since 1970. It is currently at 250,000, and will increase another 40 percent by 1995. It is a growing industry projected to create an additional 100,000 jobs during the next 10 years.

Under a freedom of choice policy, 17 States would gain more than 1,000 jobs; 2 States, the States of Illinois and Ohio, would lose a total of 17,000 jobs over a 10-year period. Approximately 50 percent of these workers in these job slots would be eligible for retirement during this period.

There should be concern about these job losses. The job situation could be resolved by retraining or relocating to other coal-producing areas.

To protect these job losses through mandatory scrubbing legislation, the U.S. consumer would be required to subsidize these jobs of high-sulfur coal production at a rate of $100,000 per job per year, which is twice the amount that these jobs are currently being compensated. It is clear that the job impact of freedom of choice legislation is far from catastrophic.

In conclusion, Senator, ACE is interested in the above principles if acid rain legislation is enacted. We do question the economic and environmental rationale of mandatory scrubbing legislation that would increase the cost of SO_2 reduction by approximately $2 billion per year for the same environmental results.

In addition, it will create another secondary environmental problem: sludge from these scrubbers. There is approximately 3 tons of sludge created for each ton of SO_2 removed.

My question is, where will the United States safely store an additional 20 to 30 million tons of sludge per year, and what will be the cost?

I must add, in all fairness, that this sludge at the moment is not considered toxic, but waste has a—I guess a characteristic—that the longer it stays around the worse it gets.

We think, Senator, that acid rain legislation must not provide an artificial or subsidized market for either fuel or hardware. The U.S. consumer is and will continue to pay the cost for environmental controls. They should not be overcharged for the product they receive.

We know and we believe that low-sulfur coal can indeed contribute to the control of the problem we are discussing this morning. It must not be legislated out of the marketplace.

Thank you.

Senator HART. Thank you very much, Mr. Storey.

We appreciate the statements of both of these witnesses in that they add the dimension of economics to what, up to now, has been a scientific and policy oriented discussion.

Mr. Rockwell, if I may, would you respond to Mr. Turk's suggestion that the PSD approach, prevention of significant deterioration, is the way to prevent the outcome occurring which I suggested, or proposed, that is of damage being done and not being discovered until it's in effect too late or too costly to correct. What is your, or the council's, attitude about that PSD approach?

Mr. ROCKWELL. We feel the application of the PSD standards through the Clean Air Act have already been exceedingly effective, and the continued application of PSD standards, as I indicated in my remarks, will continue to cause a net reduction in sulfur emissions, particularly here in the West. So we support that position fully.

Senator HART. You mentioned some proposals that you felt were unacceptable, or the council felt were unacceptable. Without naming names or identifying sponsors or organizations, what kinds of proposals did you have in mind?

Mr. ROCKWELL. Well, some of the proposals speak to the method of financing an Acid Rain Program in this country, and I spoke briefly to that point, as did Harry Storey. Namely, we think we in the West have done a very good job in reducing sulfur emissions from our stationary sources. We still, as we all too well know here in Denver, have mobile source problems that have not been resolved yet. We don't believe that our ratepayers and our citizens here in the West ought to pay double duty by being taxed equally with those areas of the country that have not yet cleaned up their problem at all, namely those states that still burn high-sulfur coal.

So financing is one of the major points we look to.

Now, the other thing we look to is the free choice that Mr. Storey referred to. We think mandating scrubbers is not necessarily cost effective. As a matter of fact, there are many technologies that will produce earlier and much cheaper results, and setting of standards by the regulators is the way to go and let the technological decisions be left to those who are producing the energy and responsible for the reduction programs.

Senator HART. Just as a matter of curiosity, has the council had any contact, formal or informal, with the industries of the Midwest who take a different point of view, if not a diametrically different point of view, namely that the utility industries and manufacturing industries who have taken the opposite policy position—have you had any debates or discussions with them at all?

Mr. ROCKWELL. Oh, I think there are constant discussions going on, Senator. I am not sure they are being very productive. There are clearly some very serious regional differences, points of view, that go to the heart of economics of our respective regions, and we feel we must support and defend the position of our own region, and in our case our own membership.

Mr. STOREY. Senator, on that question, just from the Alliance for Clean Energy's position, is that we have visited some 39 States in probably about 90 cities and made presentation on our position, so yes, we have discussed, encountered, and debated the issue, and we will continue to do that, not only in Illinois and Indiana, but across the United States. So we have been involved in that type of dialog.

Senator HART. I was going to ask you, as well, what contact you had or what response you had gotten. What do the representatives of the high-sulfur coal elements of the industry have to say about your position, aside from they just don't like it?

Mr. STOREY. I think the high-sulfur coal industry has simply taken the position that they would like to see wet scrubbers, because that is the only way, as you probably know, that you can lock in or that you can keep a status quo as far as consumption of coal in the United States is concerned, and today we consume about 840 million tons, and about 540 million tons of that is high-sulfur coal. And if you pass acid rain legislation as we have proposed, and a freedom of choice, you probably will get about 100 million tons of high-sulfur coal substitution with low-sulfur coal,

which at that point in time if the market didn't grow, then the market would be rather equal between high- and low-sulfur coal.

Certainly I couldn't say the high-sulfur coal is interested in losing 100 million tons of market. But again, we in the low-sulfur coal industry take the position of let the utility decide, let the utility make the most economic decision, be it low-sulfur coal, be it wet scrubbers, be it natural gas, or whatever it is, but leave that decision and let that decision be an economic decision, and let that decision benefit the consumers who are going to pay the bill finally.

Senator HART. Is it the alliance's position that the argument for scrubbing is really an economic argument coming from the high-sulfur coal industry rather than an environmental argument?

Mr. STOREY. I think that you probably know, Senator, since there probably isn't anybody in Washington who knows more about this subject than you, and I mean that from a very complimentary standpoint. But you probably know when the bill over in the House, which probably got more attention and more cosponsors than any other bill that's been introduced on this subject, that there was a couple things that had to happen if it was going to get the necessary votes, which Congressman Wirth talked about this morning.

No. 1 is that they had to have labor's vote, and you had to have UMW, and the only way you can get that is that you've got to freeze the workers' jobs, you cannot have any loss of jobs. So the sponsors of that bill figured up the way to do that is to mandate scrubbers. And then upon mandating scrubbers, when they found out it was going to cost the utility consumers in the Midwest an additional $20 to $30 billion over the compliance period, 15 years, then the next thing you have to do is figure out how you are going to offset that, and of course that was going to be offset with $125 or $150 per year added to everyone's electric bill.

So it was a political decision to get votes, and I don't criticize that, I think we will have to accept that as part of the political system. We happen at this time to be opposed to that.

Senator HART. That closely parallels the experience we all had back in the seventies under the previous administration when similar legislation was coming around, and some of us were very critical of President Carter for caving in, as we felt, to more senior Representatives from West Virginia and elsewhere on the question of low-sulfur coal usage.

Let me just ask a couple of questions on coal economics or energy economics, to round this out.

You gave us a broad picture of coal consumption in the country today. If world oil prices continue to decline, won't this adversely impact the entire coal industry, including the western coal industry?

Mr. STOREY. Well, I don't believe that the price of crude oil is going to decline more than $20 per barrel, and some people in the petroleum industry might not even agree with that. But let's assume it did. Coal is still going to be the most economic buy as far as Btu values.

Even today at natural gas prices, and the surplus of natural gas that we have in the United States, coal still is almost 50 percent less as far as the Btu values, or cost of Btu values, is concerned.

So we think that coal is certainly going to be a major source of energy for the development and economic growth of this country for years to come. So we are projecting in the coal industry today that the consumption or production is going to grow from 840 million tons in 1985 to about 1.3 billion tons in 1995, and that's a rather healthy growth. So we really don't see competition from other sources of energy that would eliminate the growth in coal. Certainly there is going to be some, there should be some, and we are willing to accept that.

Mr. ROCKWELL. Senator, may I comment on that? I think we Americans have awfully short memories. Whether there is a temporary decline in oil prices I think has nothing to do with the question of energy futures. One would have to ask again, does this country really have an energy policy?

But picking up where Harry left off, I think that, clearly, coal must remain as one of our principal energy sources for the future.

I am disturbed that once again we are relying more heavily than I think we should on mideastern oil. So I think our coal reserves are a very valuable national asset, and they ought to be preserved and produced properly and responsibly.

Senator HART. Well, for those of us who advocate an import tariff on foreign oil, that would certainly have that effect.

One final question, Mr. Rockwell. Do you want to comment on the Governor's recommendations with regard to the smelter industry in the Southwest? Tightening up controls there. What is the council's position?

Mr. ROCKWELL. Well, I think there needs to be some understanding about what the real facts are about the smelters in the Southwest.

At the present time there are in operation five smelters along the general border States and Arizona. Four of those operations are currently in compliance with the standards of the State of Arizona, and I think that presumes EPA compliance as well.

Two are not in compliance at the present time. The one that's heard most about is the Douglas smelter. I am advised that as of last week the State of Arizona has determined that that smelter shall be closed as of the end of this year. I think that was an action of just several days ago. Unless they see fit to install proper equipment.

So, presumably, the Douglas question will be shortly resolved one way or the other, and I think probably there will be a good many people who welcome that result.

The Magma smelter is I think in substantial compliance but not in full compliance, but it undoubtedly will be shut down in 1988. So here we have four smelters that are in total compliance, one that is badly in noncompliance, and then one in partial compliance. So I really think the problem is on its way to resolution.

One other thing I would like to add about that. I really have not been aware that the prevailing winds came from the south to the north, and I would question entirely whether or not there is any fallout in the Rocky Mountain areas from those smelters. There is simply no scientific evidence about the prevailing winds blowing in this direction, no matter how badly some of our environmental friends would like to have that happen.

Senator HART. I think that statement came from the representative of Governor Herschler, but we will try to track that down. We may also want to ask the Federal agencies about that as well.

Thank you gentlemen; thank you very much.

Our next two panels are composed of representatives of environmental and citizen organizations.

On the first panel, Mr. Robert Yuhnke, representing the regional counsel of the Environmental Defense Fund; Priscilla Robinson, representing the Southwest Environmental Services, Tucson, AZ; and Dick Camp, representing Smelter Education Project of Naco, AZ.

Thank you very much, and as with the other panels we will proceed in the order that I called the witnesses. First, Mr. Yuhnke.

STATEMENT OF ROBERT E. YUHNKE, REGIONAL COUNSEL, ROCKY MOUNTAIN OFFICE, ENVIRONMENTAL DEFENSE FUND

Mr. YUHNKE. Thank you, Senator.

I appreciate very much the opportunity to discuss this issue with you here in Colorado.

It's delightful to see you here, and I am very glad that you are taking the kind of interest in this issue that you are clearly expressing by your presence here today.

I think you have focused your attention on exactly the right issue: What should the policy be, in the face of the kind of scientific uncertainty that we have heard from the science panel today.

The West clearly has nature's warning signals sending us some kind of a message. We know that the salamander populations are declining.

Another study that was done in the drinking water supply lakes above Boulder, the natural trout population has failed to reproduce for the last couple of years.

We see the pH of rainfall down at the level of 4.7 and below, which we know is the pH level that in other parts of the country and the world has been associated with acidification of the lakes.

Well, having this information at hand, but not having done a lot of research in the high country to know what the consequences are in terms of changes in the environment, what course do we follow?

What I want to do here this afternoon is to focus your attention on the pollution trends, what EPA is saying can be expected to occur with regard to the total emissions of sulfur dioxide and nitrogen oxide in the West over the next 10 years.

The EPA has just completed a new study that was released in June, which I think is extremely significant as a contribution to understanding what we are facing here in the West.

SO_2 emissions today, the sulfur deposition, are half of what they were in 1981, and in fact they have been half of what they were in 1981 since 1982.

This is a result, we think, of reductions in copper production that have occurred because of a collapse of the copper market.

But also because, as Governor Anaya pointed out, the State of New Mexico has required new controls on the Four Corners powerplant for SO_2.

But except for Dr. Harte's work, which preceded this decline in copper production and sulfur emissions, the lake studies that the scientists have been working with have virtually all been done since 1982.

So we don't really know what was going on with the lake chemistry back in 1981 and earlier when pollution levels were twice what they are now.

The studies that have looked at the summer chemistry since 1982 show very low buffering capacities in the lakes. There is very little ability to absorb acid. But not acid-dead lakes. We are very fortunate in that respect.

Dr. Harte, who has looked at snowmelt for the last 2 years, is saying that he is finding short-term acidification during snowmelt. And that is at these lower SO_2 emission levels and deposition levels.

Now, we don't know what the effects will be when we return to 1981 emission levels and deposition rates.

And by the way, the deposition of sulfur has very closely followed the emission curves, so there seems to be a close correlation between the sulfur that's coming down and the sulfur that's going up.

If U.S. smelters are not controlled and copper production resumes to 1981 levels, and Nacozari comes on line at the end of the year which it is expected to do, then sulfur emissions and sulfur deposition rates will be approximately 25 percent higher than they were in 1981.

Now, the EPA study that I referred to shows that sulfur deposition in the Rockies will be about 20 percent higher than 1981 once Nacozari emissions are added to 1981 emission levels in the West.

So if copper production simply resumes where it was in 1981, with Nacozari added, we are going to have significantly higher sulfur pollution levels in the region. Scientists can't tell us right now exactly what the consequences of that will be.

Now, the EPA study also gives us a very important insight into the nitrogen oxide pollution levels in the Rockies. You heard Dr. Gibson and Dr. Fox indicate that nitrogen oxides are a more important part of the total problem here in the West than they are in the East.

In the intermountain region, new coal-fired powerplants now on the drawing boards, according to this EPA study, will increase nitrate concentrations in western Colorado in the mountain region by 100 percent in the next 10 years, by 1995.

So we are faced with the prospect of both a doubling of sulfate levels above current levels, back to 1981 levels and higher with Nacozari, and a doubling of nitrate deposition above current levels.

Now, from our perspective, given the fact that the lakes appear to be near the brink of acidification, if not already there, then we think that these trends clearly suggest a need for some preventive policies that would be aimed at changing those pollution trends.

Now, for sulfur dioxide there are solutions available that are already in the law and that can be achieved by successful negotiations with Mexico. As Bruce Rockwell pointed out, on the U.S. side of the border sulfur dioxide levels will go down after 1988 when U.S. smelters are cleaned up. That's a very important step. But if

we don't also clean up Nacozari we will effectively be standing still at 1981 pollution levels, so that we've got to clean up both on our side and on their side to see a permanent reduction of SO_x pollution levels down to the levels that we have right now.

But that's doable. That's within the realm of the possible, and it doesn't require a statutory amendment on our side, other than to clarify some ambiguities that EPA has written into the statute, which Priscilla Robinson will talk about.

On the NO_x side of the equation, we have nothing that's doing the job. We are not putting controls on sources for nitrogen oxide in the West, or any other part of the country, for that matter. So what we are seeing is that currently the NO_x inventory from new sources, not the existing sources, not the copper smelters, but the new powerplants are adding much more NO_x pollution than they are SO_2. The reason for that is the PSD program, the way it is currently structured.

The current increments for sulfur dioxide are forcing powerplants in the West to install good control technology. That, as you know, Senator, has been a major point of contention since 1977. Western utilities have long argued that they should not have to put on controls because they burn low-sulfur coal. But the important point to recognize is that by having put scrubbers on our western powerplants we have reduced 450,000 tons of sulfur dioxide in the West since 1978 from powerplants that otherwise would have been built without scrubbers. That 450,000 tons is the equivalent of what we are going to see from Nacozari. This has been a major contribution to saving the West from a more serious acid rain problem than we would have had.

But we are not doing the same thing for nitrogen oxide. We are not achieving the same kind of emission reduction. What we have got to do if we are going to eliminate or cut into this 100-percent increase in nitrate pollution is to start achieving the same results for nitrogen oxides as we have been achieving for SO_2. And EPA is pointing the way. In a test case which we have been working on with EPA, in June the Agency announced that it was going to require Chevron's oil shale project on the west slope, where there was a projected significant increase in nitrogen oxide emissions causing potential acid rain problems, EPA required Chevron to install 80 percent nitrogen oxide control technology, which was the first time ever that EPA had required this technology in the United States.

Now, essentially what EPA is saying to us is that that technology is here, it's available; 5 years ago it wasn't, but we now have a solution. We can eliminate 80 to 90 percent of this nitrogen oxide problem by putting that control on all the new sources that were taken into account in the EPA regional study. But there is no mechanism in the law to require that.

If we add an increment for nitrogen oxides to the PSD program the way there is now one for sulfur dioxide, we can achieve that result. That's what we recommend to the Congress as the most significant new addition to the law to protect the West.

Thank you.

Senator HART. Thank you. Miss Priscilla Robinson from the Southwest Environmental Services.

STATEMENT OF PRISCILLA ROBINSON, DIRECTOR, SOUTHWEST ENVIRONMENTAL SERVICE

Ms. ROBINSON. I'd like to begin by saying how very much we appreciate being invited to come here from Arizona and explain or try to explain the smelter issues for you, and how much we appreciate your interest in them.

My testimony will be focusing specifically on Arizona smelters. I'd like to begin by addressing and clarifying a little the issue of the State operating permit for the Douglas Pheips Dodge smelter at Douglas.

The State issued an operating permit for the Douglas smelter on Friday. The operating permit is an annual permit. It only runs to the end of this year because that's the way they are all written, and Douglas will apply for another one. We are hopeful that the State is now beginning to look at the conditions of that permit and will be enforcing things. But in no way does that date ensure closure of that smelter by the end of this year.

I would like to clarify that issue, and I think Dick may say a little more about the operating permit, or we can explain some more about that later.

I'd like to put the Arizona smelter emissions into come kind of context for you. Mr. Rockwell is correct when he says that many copper companies have spent hundreds of millions of dollars to bring smelters into compliance, and there are indeed three smelters that are operating in full compliance, and there are other smelters that are unfortunately closed that would be in full compliance if they were operating.

However, there are two smelters that are not in full compliance. These are the smelters that are presumed to be eligible for NSO's, and those two are responsible for the bulk of the emissions. Those two smelters, Douglas and San Manuel, together, are responsible for over half a million tons of SO_2 every year, and they have continued to operate at more or less the same levels regardless of the downturns, which is an interesting thing, and as a consequence they are responsible for even larger percentages of the total as other smelters come into compliance.

That half a million tons that they are responsible for compares that added to that would be from 300,000 to 400,000 tons from the Nacozari smelter. And as Bob has said, the new emissions from the Nacozari smelter will about equal or more than equal the emissions that were reduced as other smelters cleaned up. So if the Nacozari smelter comes on line without controls, the hundreds of millions of dollars that have been spent already by Kennecott and ASARCO and Inspiration Copper Cos. in Utah, and Arizona, and New Mexico, that gain will have been wiped away.

I am going to be focusing on specific changes that we would like to see made in section 119. These changes are not anything new. What we are basically asking for here is that Congress put back the original bargain that was struck in 1977. The agreement that formed the basis for section 119 in 1977 was that, in return for a delay in complying, the smelters agreed to operate supplementary control systems so as to maintain the ambient health standard.

The deadline was set at 1988, and there is a discussion of schedules of compliance in section 119.

What has happened since then is that the smelters have had over 8 years, the two smelters that have chosen the NSO route have had about 8 years this month of benefit of the delay; the public part of the bargain has not been kept. Monitors in the Douglas area and the San Manuel area have shown exceedences of the standard every year since 1977. My written testimony includes a list of 19 exceedences at Douglas monitors near Douglas, AZ, in 1984. That's 19 exceedances in 1 year. And there has been no mechanism to enforce those, because—primarily because of delays and mismanagement by EPA.

We are also concerned about the enforceability of the 1988 deadline. As you have heard, a great deal hinges on cleaning up those two smelters by 1988. We are particularly concerned, of course, because of the linkage between the Douglas smelter and the agreement with Nacozari.

I would like to read a couple of statements from the joint communique issued July 18, 1985, following the meeting of the national coordinators—that's of the United States and Mexico—in San Diego. It reads like this:

> The Mexican and United States National Coordinators agreed that the control of the Douglas and Nacozari smelters should be linked so that interim and permanent controls will be applied.

And later in the document, and this is a quote:

> With regard to the Douglas smelter, the U.S. Government gave a firm commitment that the smelter will comply with the provisions of the Clean Air Act as soon as possible but no later than January 1988.

We have a real concern that, because of EPA's mismanagement of the program, that we may have difficulty in enforcing our part of that bargain.

Dick is going to talk more about aspects of the Mexican negotiation, and I will be focusing on how our problems—in meeting that deadline.

The problem becomes clear. Because of delays, the second NSO's for these two smelters are only now being submitted and reviewed. They have not been issued. The deadline problem becomes clear with regard to the Douglas smelter. The draft NSO includes a letter certifying that they will close on January 1, 1988. However, other places in the NSO is a statement that no part of this NSO is enforceable after January 1. So on January 2 the letter certifying that they will close is nothing but a piece of paper. And this line of reasoning is consistent with EPA's regulations.

In other words, the commitment to close is not enforceable after January 1. We believe that EPA would have to begin enforcement procedures from the beginning, and that could take as long as a year, or two.

The problem with schedules of compliance arises with regard to the San Manuel smelter. Everyone has always assumed that the San Manuel smelter, which is in about 50-percent compliance, will complete the process of modernization. However, the draft NSO that they have submitted does not include a schedule of compliance, and EPA concurs that they don't need one. At this point they

have 2½ years to go. We all know that if they don't commit to something and start to work, they will not be in compliance by January 1. Nonetheless, there seems to be no mechanism to force a schedule of compliance, because of the way section 119 is written.

Senator HART. Excuse me one second. We have one more panel, so to the degree you can summarize, I would appreciate it.

Ms. ROBINSON. OK; I will. So what we are asking you to do is to tie the enforcement of the ambience standard to the NSO, clearly, in 119. We are asking you to clarify the 1988 deadline and to require the NSO smelters to commit to an enforceable document so that they can be closed and/or schedules of compliance.

And to conclude, I would like to read from a letter that was submitted to the State of Arizona by an attorney for San Manuel, so that you can get an understanding of what the industry intends:

> Congress clearly intended that such smelters—that's those eligible for NSO's—remain free during the second NSO to continue research into more cost effective means of control, to seek further extensions from Congress if necessary, or to close at the end of the NSO period. Under section 119, as long as the necessary controls are 'not reasonably available,' the smelter is not required to begin increments of progress toward compliance with stack emission limitations.

Now that view, in which EPA appears to concur, is clearly on a collision course with the agreements we are making with Mexico.

If this is not Congress' intent—and I would remind you that the legislation that came out of the Senate committee did in fact provide for an extension to 1993—if this is not Congress' intent, we feel that it is important that speedy action be taken to clarify this issue.

In conclusion, I would like to concur with what Mr. Storey said, which is that environmental legislation should not reward those who elect to be last.

Thank you.

Senator HART. Thank you very much.

Mr. Kamp, representing the Smelter Education Project.

Let me just say, we are very pleased that both of you came from Arizona. The record should reflect that along with other Governors of Wyoming, Colorado, and New Mexico, the Governor of Arizona was invited to testify. Unfortunately, he was unable to be with us. But we do appreciate your coming up.

STATEMENT OF RICHARD KAMP, SMELTER CRISIS EDUCATION PROJECT

Mr. KAMP. Thank you, Senator Hart.

The project that I'm the director of, the Smelter Crisis Education Project, is a binational one that has been advocating control of the Douglas, Nacozari, and Cananea smelters.

My focus is because of the fact that 85 percent of the emissions that are likely to be coming out of the smelter triangle in 1986 come from Douglas and Nacozari is not going to include the Cananea group, which is much smaller. The actual tonnage is something nobody has touched on.

It's very possible that in 1986 you're going to have, from three smelters 55 miles from each other on the border, a total of 2,700 and 2,800 tons a day of SO_2, and there is no total that great that's documented in North America. That's considerably larger than the

sub 1. Douglas and Nacozari alone will contribute somewhere in the area of 2,400 of those tons in 1986. That's roughly, I believe, around eight times of what the entire State of Colorado puts out in SO_2. I'd just like to get that into perspective.

I think another one—my major concern as a local representative tends to be air pollution, period. I live 20 miles from Douglas.

But taking the EPA study that was released in June and accepting their figures, Douglas and Nacozari alone in 1986, based on current production levels, will be turning out around 25 to 38 percent of all sulfur deposited in the Rockies.

What I really want to do in this very brief summary time is to propose three directions for congressional legislation. I'll back up briefly and explain why, Senator.

The first is the development of what you might call an international boundary air commission, an international/binational agency, to oversee air quality agreements between the United States and Mexico. It's equivalent to the International Water Commission. It's a natural spinoff of what is developing anyway in the negotiations, but it doesn't exist here as an enforceable entity.

The second is—and I'm going to try to explain this, I think it's real critical because of what Priscilla has been talking about—that there be established a reduced short-term emissions limit for the Douglas smelter far below the one that exists, and that will be linked with a similar emissions limit in Nacozari. I'll explain that in a second.

The third is one which concerns principally the State Department in negotiations with Mexico. There needs to be economic negotiations with Mexico in the search for alternatives for operating the Nacozari smelter prior to 1988 with no controls and no emission points, economic negotiations that would provide potential trading agreements with Mexico, providing capital that would go to the building of controls at Nacozari. And I'm not talking about giving money, I'm talking about loans.

Those are either unacceptable or secondary issues. The joint agreement that was not signed—it was basically a joint communique—is very tentative. It is not binding.

On July 18, the United States and Mexico agreed that the Douglas and Nacozari plants be linked. A Mexican company in Nacozari, and not the Government, asked if they would give a firm commitment if they would install a plant to control sulfur by January 1988. The Mexican Ministry that was negotiating gave a clear statement that they had no authority to regulate sulfur at this time, nor do they hope to by 1986, and the copper company asked to operate the Nacozari smelter—well, they said they intend to operate it prior to 1988 in order to gain the money to install the controls.

It was also announced by the Mexicans that they would attempt to have final emission limits by the end of this year and the Cananea smelter will not be expanding without controls.

The process that the EPA is involved with on Douglas, the NSO process, does not technically require that the smelter be in compliance January 14, 1986. The reality of it, and the EPA will be put to the test, is that if there is not an NSO, what it's going to do is give them grounds to carry out legal actions to enforce it, and they be-

lieve that those could extend easily to 1988. If there's a loophole beyond 1988, it can go beyond 1988.

So that brings in what I was talking about, which I'm going to call an interim emissions limit.

The Douglas smelter is allowed to put out 1,122 tons per day of SO_2. The actual emission limits have been less than around 400 tons per day. That's under 400 tons per day of SO_2.

What I'm proposing is that Congress propose legislation that would put a maximum ceiling on Douglas of 400 tons per day of SO_2, which does not supersede the process that the EPA is involved in, in either denying or granting the NSO, but it is providing a cushion that will allow us to negotiate a linkage which has very clearly been stated between the United States and Mexico and, at the minimum, ask for the same emissions limit in Nacozari. I'd like to point out that it's an emissions limit that reflects actual operation a number of times in the past 6 years, 7 years.

Second, that the Douglas jobs issue is being effectively negated, and this is not directly directed to the negotiations, but there's 800 new jobs coming into Douglas by 1986, 450 of which are commensurate in salary with the smelter.

The second part of this is that the establishment of an international boundary commission needs to be done in very close cooperation with the State Department and EPA—that is a duly constituted international commission that the Clean Air Act talks about in section 115—and the earlier that becomes a reality, the stronger any agreement with Mexico becomes.

I think the final one is just what I mentioned before, that we need negotiations with Mexico; that this is the most confusing of issues that the State Department recognizes. It's also consistent with the policy that the State Department has had in Mexico of establishing agreements and providing capital or trade which will be utilized contingent on certain actions being taken.

The contingency here for Douglas is that they don't open the Nacozari smelter in order to collect the money to pay for the acid plant because there is an alternative means of generating capital. That's a tough one. It's one that the State Department recognizes as possible and is willing to pursue.

The other one, the environmental ones, of establishing a commission and establishing an international emissions limit, are courses that are completely consistent with negotiations going on right now. I discussed them before I came here with the State Department representative Duane Messner.

So no matter whether Douglas closes in 1986, whether there is some kind of economic alternative to operate the Nacozari smelter in order to put the controls on it by January 1988, that gives you a real viable means of proceeding with negotiations. If you don't have that, I think you're going to be looking at 1986 opening and Douglas operating at 1,000 tons a day of SO_2. And those are just enormous figures, and living in that area I see the pollution. I mean I'm in the middle of it and I'll be gone, and so will at least 100 to a 150 others.

Thank you very much.

Senator HART. Thank you very much, Mr. Kamp.

Mr. Yuhnke, you heard the scientific and government representatives discuss the limited data base, what we don't know. Do you have any general response to that, and do the two witnesses, with regard to the smelter problem, have any response to that?

Mr. YUHNKE. Well, I think the general description of what we know is quite accurate. Most of the measurements that have been done in precipitation have been done in lower elevations and not in the high country where the sensitive areas are, and what little information there is that has been collected from the high country indicates that the precipitation at higher elevations is significantly more acid, as Dr. Gibson speculated.

So the problem is, in fact, worse than what most of the measurements show at lower elevations, currently what's coming down.

In terms of the lake chemistry, most of the measurements that have been done have been sample collections during the late summer when it's easy to get up in the high country lakes, so that what we know of lake chemistry is mostly late summer chemistry.

Dr. Harte's work for the last two springs is the only data that I know of that indicates what's happening during snowmelt.

Now, we don't know if that same phenomenon is occurring in lower lakes, but there's no particular reason to believe that it is not, given the fact that we do know that deposition rates throughout the West are quite uniform, the amount of pollution that's coming down in various parts of the West is relatively uniform. So you cannot prove that short-term acidification is happening in many lakes, but neither can you conclude that it's not happening.

In the face of this uncertainty, the question then becomes do we take a cautious approach to try to prevent the problem or do we do nothing while we monitor what happened.

Our fear is that if we simply monitor and don't pay attention to the air pollution trends that I focused on, that we will find 5 years from now, after the scientists have generated enough data to allow them to draw some statistically significant conclusions, that, in fact, something has happened.

But in the meantime, in those 5 years, 7 years, or whatever it takes to do that, we're constantly issuing permits for more new sources of pollution, and the pollution today will not result in a source that's built until 2 or 3 years from now, and the pollution that comes from that source we will not be able to statistically measure in the lakes for 4 or 5 years after that.

So if we only follow the water chemistry, we're going to lose the ballgame. We have to look ahead and see what we're doing to the air pollution trends.

Senator HART. What about the general agreement up to now that the so-called PSD approach is protection against increased deterioration?

Mr. YUHNKE. I think that the PSD program has worked quite well for sources of sulfur dioxide, as I indicated. But the big gap in the PSD program is that it has not succeeded in forcing use of what EPA now considers best available control technology, and that is because there has been no increment for nitrogen oxide to put on a vehicle, in nitrogen oxide pollution, that would in turn drive the decisions needed to put out controls.

If we add that component to the PSD program, then I think we will have, with existing law, the tools in place to do the job that we need to do, at least over the next 10 years while we are expanding the data base and getting a better picture of what the total needs are.

Senator HART. Miss Robinson, do either you or Mr. Kamp have any response to Mr. Rockwell's assertion that we don't have data on the northbound transport of pollutants?

Ms. ROBINSON. I'll turn that over to Bob for that.

Mr. YUHNKE. Well, there's two ways to approach that question. I did some original research which is included in our written statement where we simply compared the changes in sulfur emissions and changes in sulfur deposition, the emissions coming from southern Arizona, the deposition being measured up the entire length of the Rockies. And what we found was there was a very close correlation between deposition in the Rockies and emissions from Arizona.

Now, that's circumstantial evidence, but it certainly suggests to us that there's a significant amount of transport from Arizona to the Rockies.

Now, the other way to approach the question is the modeling approach which Dr. Fox alluded to, and that was the approach used by the EPA in its regional pollution study that came out in June. Based on the Agency's modeling approach, they have concluded that approximately 36 percent of the sulfur being deposited in the Rockies is coming from this region.

Our approach led us to conclude that it was approximately 50 percent, but I think somewhere within that range, from a third to a half of the sulfur in the Rockies was coming from the copper smelters, is a reasonable estimate based upon these two separate approaches of assessing the problem.

Senator HART. Two quick questions because we're now well over our time. We still have one panel to go.

Miss Robinson, you referred to EPA mismanagement. Do you want to document that as briefly as you can?

Ms. ROBINSON. Yes, the first problem is EPA's failure to set final emission limits for smelters. Final emission limits for smelters were not set until 2 weeks after the statutory deadline.

This has created an endless tangle of problems which I will not continue to document.

Then following that, they took the position that the NSO applications would not be necessary until they promulgated regulations for the second NSO, and they sat on that position for 17 months until the three of us filed a lawsuit that moved them.

So a lot of problems stem simply from this delay.

Other problems stem from the conclusions that they came to in the regulations for second NSO's. Those conclusions include the fact that schedules of compliance are not necessary. They include the fact that the NSO—there's nothing in the NSO, including the agreement, to closely enforce the NSO, which creates this kind of busy little paradox. And also the fact that the smelter is not required to demonstrate and comply with the ambient air standard.

They failed to tie maintenance of the ambient air standard to the life of the NSO itself. We would have preferred to have some mech-

anism whereby the NSO would be revoked if the ambient standard is not maintained. That's not in there. So it's a kind of toothless wonder.

Senator HART. Finally, Mr. Kamp, have you come up with any administration officials, and what's their response?

Mr. KAMP. What they want to do specifically is to take the existing technical working groups that are United States and Mexico joint groups in the negotiations going on under the agreement, which is an executive agreement, and to turn over to them the implementation of an agreement as it is developed.

I think there's some real problems with that—international boundary and air emissions. And as far as I'm concerned—these are the exact same individuals—I think the definition of the Agency as being duly constituted to carry out enforceable powers of the United States and Mexico as interpreted by an interpreter. So they agree with the concept of it. And in the annex that they were going to propose in July—which they didn't, they spoke of this working group as being an international duly constituted agency—but as it is they've kind of faded away along with anything that involved legitimate legal commitment. It was a positive step, but all they really did was write a letter stating how they felt on July 18.

Senator HART. Thank you all very much. We appreciate your testimony.

Our final panel includes W. Mitchell, vice chairman of the National Parks & Recreation Association; Maggie Fox, Southwest coordinator, Sierra Club; and Anne Vickery, Colorado Mountain Club; and Debora Beck, executive director of the Wyoming Outdoor Club.

Thank you all for being here. Actually, we're in very fine company here, as we can see.

We'll reverse what in the old days was considered to be the polite thing to do and hear from the male first, W Mitchell.

STATEMENT OF W MITCHELL, NATIONAL PARKS & CONSERVATION ASSOCIATION

Mr. MITCHELL. Senator Hart, thank you very much.

It's particularly a pleasure to realize that your staff has saved the best for last.

I am the vice chairman of the National Parks & Recreation Association, which for the past 65 years has exclusively concerned itself about the health and the future of our National Parks System, and to recognize that, as we are blessed in this area called the Golden Circle, in this four-State region with one-fifth of the national parks in the lower 48 States, it should make us particularly watchful of threats to that great resource.

We talked earlier today about the benefit, the economic benefit of recreation and of tourism. In Colorado, we recognize that some $3.9 billion was spent last year by tourists, so I hope that dispels the idea that you can't sell blue sky.

And, in fact, more important than what we sell is what we save. I think it's very critical that in 1977 Congress added to the Clean Air Act quality and visibility protection for our parks and wilder-

ness areas. While Secretary Watt tried his best to prevent integral vistas from being considered, we are pleased that we have watchful Members of Congress to look at issues such as that.

Recently, National Parks & Recreation Association, through the Freedom of Information Act request, had released to it by the Department of Interior their analysis that shows conclusively that, even couched in the most conservative scenario, the benefits of protecting these views far outweigh their projected costs.

I've included some of that today in my testimony, which shows that of some 55 units of the Forest Service, 23 units that are designated by Congress as wilderness areas, and 11 national parks here in the West, all are susceptible to acid rain.

Finally, I think we should stop and remember when we talk about acid rain, and while we're often aware of the damage to the national resources, that the New York Times recently spoke in their newspaper of in excess of $5 billion that will be lost to material items such as statues, tombstones, and other manmade heritage that this country enjoys.

But more importantly than the $5 billion lost, it was the quote that I read from the American Institute of Architects, and they said, in part: "and as they become lost, a part of the national soul and of our national memory goes with them."

Those are not replaceable items that we will lose if we don't tend to be careful and look forward instead of backwards with acid rain.

Those who say, Senator Hart, that acid rain has not been proven, has not already done any damage, are probably the same ones that tell you that Union Carbide West isn't going to do any damage because it's still 1 mile from your house.

I appreciate your interest, and it's evident that you are interested in this issue.

Thank you very much.

Senator HART. Thank you for being here. We'll have some questions. Miss Fox.

STATEMENT OF MAGGIE FOX, SOUTHWEST REPRESENTATIVE, SIERRA CLUB

Ms. Fox. Yes, Senator Hart. Can you hear me?

Senator HART. Yes.

Ms. Fox. I'm known for a soft voice.

Instead of putting you through listening to the testimony, probably much of which has been said earlier this morning, I'd like to address some questions that you have raised.

My name is Maggie Fox, and I am the Southwest representative of the Sierra Club. This region covers a four-State area, Arizona probably the most heavily impacted by the western acid rain. And I also represent the national Sierra Club.

I think the Sierra Club has a particularly unique interest in this problem as an environmental organization. The members have spent a considerable amount of time and resources working for protective designations of national parks. It is also a leader in the acid rain matter nationally.

In particular, a question you asked earlier in relationship to Mr. Rockwell's testimony was about whether or not there is document-

ed evidence as to the unregulated areas of southern Arizona and depositions in the northern Rockies.

According to U.S. Weather Station data, it shows a prevailing wind pattern, and for all time that has been measured, then, from the Southwest to the Northeast. That is, wind patterns that arise in southern Arizona, southern New Mexico, move from south to north and then turn eastward along northern Colorado and Utah and Wyoming.

The question is whether or not the uncontrolled emissions from the Arizona smelters are landing on the high altitude watersheds of Colorado.

While we don't have any appropriate scientific evidence to that effect, we also have the evidence from the Northeast to the Midwest that the tall stacks that were put on the powerplants in the Midwest did not alleviate the problem of SO_2 emissions, but simply moved those emissions to land and the lakes of the Northeast. And we have the very serious problem that we have in the Adirondacks right now because of long stacks.

So while perhaps imperfect science is unavailable right now on the whole issue of whether there are uncontrolled emissions, there's an enormous amount of evidence that it doesn't take a scientist to figure out: That, in fact, we do have this problem, and the problem is coming from our two uncontrolled American smelters.

If you take the 400,000 tons that we are getting placed on our high altitude watersheds by those two American smelters and the 500,000 tons that will come from the uncontrolled Mexican smelters and the 9,000 tons of SO_2 emissions unregulated falling on our high altitude watersheds, I think that's cause for concern. I think we need to do something about it.

How can we ask the Mexican Government to put out the money and the design to control the Mexican smelters when we do that with the American smelters?

We thought we had done that in 1977.

It appears now that on January 1, 1988, Mexican smelters and the American smelters will not be in compliance. We need to do something about that.

It's not very difficult to get the Congress to act, and we don't need perfect science to prove that.

I think the other point that was not raised today, that I had just learned recently, is that while there is research being planned for our high altitude wilderness lakes, there is no research currently going on, with the exception perhaps of Dr. Harte, in our high altitude wilderness streams.

Now, that is not the case in the East.

EPA and other agencies have recognized it's important to do research on streams in the East because the streams are lake fed.

That is not the case usually in the West. But although our streams are not often originating in lakes, they are coming from snowmelt, and the problem is arising from acid deposition on our high altitude mountainous watersheds. That is snowmelt.

So we really need to be advocating for research on our streams as well as on our lakes, and not simply waiting to get the results from the lakes and then move, 10 to 15 years from now, to looking

at what's happening to the fish species and the water quality values on our streams.

Thank you very much.

Senator HART. Thank you very much, Ms. Fox.

Miss Vickery, representing Colorado Mountain Club.

STATEMENT OF ANNE VICKERY, CONSERVATION DIRECTOR, COLORADO MOUNTAIN CLUB

Ms. VICKERY. Thank you, Senator Hart. Can you hear me?

Senator HART. Yes, I can.

Ms. VICKERY. You pretty well summed it up when you said perhaps the public doesn't want something bad to happen and then have to fix it. But if it's all right, I'll go on a little bit.

I'd like to talk about the need for some stringent acid rain provisions for the West.

I am the conservation director for the Colorado Mountain Club, and I am here today representing those groups and individuals who use and value the high country potentially affected by acid deposition.

We want you to know that we care a great deal about the high country, the lakes, and the forests.

In Colorado there are over 27 wilderness areas, 2 national parks, and 7 national forest units, most of these well above the 9,000-foot sensitivity line for potential acid deposition impacts.

They are considered as watersheds, as recreational areas, and as natural ecosystems, to be protected and passed on intact to future generations. They are national treasures and national wildlands.

And, as Governor Anaya said, it is a national problem to protect them.

There was a National Wilderness Conference held recently in Fort Collins, and one issue that was referred to again and again is that wilderness areas are living laboratories, they are national gene pools that have to be protected.

We as citizens fear that, without substantive acid rain legislation affecting the Western United States, air pollution will literally eat away at the vegetation and poison the waters of our high country.

The key seems to be in the answers that you receive to your questions from Doug Fox and Jim Gibson.

The West is somewhere in between the pristine areas and the pollution of the Eastern United States, and the higher sensitive lakes may be closer to the eastern values.

I think we must remember that in the East research did not stop damage to lakes and forests.

We know from the experience in Scandanavia that the western lakes are probably in the first stages of irreversible acidification. Now, some say that because there are no dead or dying forests there is no problem, and all we need is further study.

As a citizen representative—and I cannot stress this enough—we want to stop the current trends before it is too late, and we need your help.

Short-term acidification has been measured, perhaps in only one lake in Colorado. But that's because the measurements have only been done for one lake.

But it is likely happening in many other lakes. And if some of these lakes die, they probably will all go at once.

We know that emission controls for stationary and mobile sources are expensive. However, there would be no greater cost than trying to repair an ecological tragedy.

We don't know how much it would cost to reclaim the lakes and the forests, and even if restoration is possible.

As a citizen I would rather pay for pollution reduction.

And we urge the committee to consider significant tax reductions for industries that have stringent pollution controls, and significant pollution taxes on imports from other countries that have weak or nonexistent environmental laws and, therefore can produce goods more cheaply.

The polluting industries are not the only industries affected by acid deposition. Major industries in the West will suffer considerable financial loss from increases in acid deposition.

In Colorado, as W. Mitchell said, tourism and recreation is the second largest industry in the State and brings in over $4 billion annually.

Visitor registers placed on the top of Colorado's 54 peaks over 14,000 feet high show that visitors from an average of 40 States and 6 foreign countries come consistently every year to each of these popular areas. And these are the high altitude areas that are most sensitive to acid deposition.

Approximately $600 million of the tourism industry in Colorado comes from fishing. Over half of this is spent in urban areas, in preparation for a recreational trip, so it's not just a rural problem.

If Colorado gains a reputation for having acidic lakes, the whole tourism industry will suffer, and I am sure this is true for other States in the West.

Regarding your discussion about the current PSD regulation, there are three regulatory issues I would like to bring to your attention.

First, EPA recently ruled that individual States, through their State implementation plans, would have the final say over allowing significant impacts to national parks, monuments, and wilderness areas. This cannot be allowed to happen.

EPA would be giving up the regulatory authority of the Federal land managers, that is the National Park Service, the Forest Service, and BLM, over areas which have been set aside as national treasures and national wildlands, and would violate the public trust and the Federal responsibility to preserve and protect these lands.

Two, in the permitting process and confusion over what is meant by cumulative analysis and cumulative impacts must be clarified.

It has been argued that if a source analyzed in isolation is not predicted to violate the increment or cause an adverse impact, that source does not need emission controls.

However, it is only a matter of time before just a few sources, each analyzed in isolation, together can cause significant long-term impacts. The sources can be in the same State, in neighboring States, or hundreds of miles from each other.

What is important is not each source in isolation, but the combined impacts on lakes, forests, and wildlife.

Three, EPA recently granted a PSD permit to Chevron oil shale. That's the permit that has been mentioned requiring strict NO_x controls.

However, in the decision, EPA denied a request that, if significant impacts were detected through monitoring in a class I area, EPA would return to the industry and require additional controls.

Now, according to the EPA interpretation of the Clean Air Act in that decision, EPA and the public can monitor impacts occurring in class I areas, but EPA will not take any action to reduce the documented impacts and the pollution.

EPA's interpretation, or the act, or the regulations, must be revised. Otherwise, the intent behind the PSD regulation loses all meaning.

In conclusion, as we citizens are looking to the Congress to come out with some strong measures to keep western lands and waters from going the way of Scandanavia and the Northeast.

The cost to the public and the tourism and recreation industry is incalculable if we do not take preventive action.

We urge that the PSD regulations be revised, that the Clean Air Act be strengthened, that there be western acid deposition legislation.

We urge that this legislation include an increment for NO_x and a requirement for stringent NO_x controls.

Significant economic incentives for both mobile and stationary sources to reduce emissions.

And, it is likely that NO_x emissions are affecting our nearby Indian Peaks Wilderness and the Rocky Mountain National Park.

We urge an acid deposition standard, a requirement that polluting industries reduce emissions if monitoring indicates significant impacts in class I areas. We urge a requirement that States, through their SIP's, must prevent significant adverse impacts to Federal class I areas.

And we urge a clarification of the cumulative impact provisions in the PSD regulations so that it is clear that it is the combined impact that must be assessed.

Thank you very much, and I appreciate this opportunity to appear here today.

Senator HART. Miss Vickery, thank you very much.

And certainly not the least, but our last witness, Miss Debra Beck, representing the Wyoming Outdoor Club.

STATEMENT OF DEBRA BECK, EXECUTIVE DIRECTOR, WYOMING OUTDOOR COUNCIL

Ms. BECK. Good afternoon, Senator Hart.

I am truly grateful for this opportunity today, and before I forget I would like to thank Mr. Mitchell and hope that he meant his remark seriously that you did save the best for the last.

Senator HART. He always does.

Ms. BECK. I am very tempted to ad lib, too, but I have been known to go significantly over my time period when I do that. Fortunately, I have chosen in advance to concentrate on an area that has come up that has been questioned here today.

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You have heard much about the acid sensitivity of many high elevation ecosystems in the West. Everything we learn, it seems, reinforces our fears that many of our priceless natural areas are extremely vulnerable to damage by acid rain. In the short time allotted to me now, however, I will not try to repeat that evidence. Instead, I would like to share with you some personal insights that we have gained, the Wyoming Outdoor Council has gained, from our experiences trying to protect one of those very special areas under the current law.

The Wind River Mountains of Wyoming contain some of the most acid-sensitive surface waters—and some of the best fishing, I might add—in the West. Over 2,000 lakes occur in 2 class I wilderness areas there. Some have no measurable alkalinity; all average less than 100.

In the past 14 months the State of Wyoming has permitted or is in the process of permitting three new sources of acid pollution directly upwind of this fragile area. These will result in an additional 8,000 tons of SO_2 and 1,400 tons of NO_x annually. Concerned about potential impacts in the Wind Rivers, the Outdoor Council participated actively in the permitting processes for these new sources.

Now, Wyoming air quality regulations on class I area protection contain language identical to that of the 1977 Clean Air Act amendments. Congress' intent in passing those amendments was to prevent air pollution related damage to class I areas. In fact, the Senate declared that, in the case of doubt, the decision to permit a new facility should err on the side of protecting air quality values.

Permits are being issued in Wyoming, however, in spite of considerable doubt about potential effects, and I would like to give you some examples.

No. 1. Decisions are based on little or no information about the baseline condition of class I area resources.

No. 2. Air quality impacts are predicted at distances which are two to four times the model design limits, and give times the distances at which these models have been tested.

No. 3. Air dispersion models are used to predict sulfur and nitrogen deposition rates, a use never intended for these models and unconfirmed by field testing.

No. 4. Total acid deposition is estimated by predicting dry deposition rates and then assuming that the rate of wet deposition will be the same. There is no information that this is true in the West. In fact, nearly all agree that the rates and the ratio of wet to dry will vary with precipitation, terrain, elevation, and many other factors.

No. 5. Current acid deposition estimation techniques take no account of precipitation rate or the effects of clouds or fog, that I believe Dr. Fox mentioned earlier. The result of this very likely is significant underestimation of total deposition at high elevations where precipitation is greater and fog occurs more often.

No. 6. Water chemistry changes are predicted for so-called indicator lakes, although more sensitive lakes exist which may be impacted sooner and more severely by acid deposition.

No. 7. Impact predictions ignore acid deposition resulting from out-of-State sources, and we have heard about the Environmental Defense Fund study that shows that southwestern copper smelters may actually dominate sulfur deposition in the central and north-

ern Rockies at sites as much as 600 miles away from the Phelps Dodge smelter.

No. 8. Only annual impacts are estimated. Short-term changes, such as acid shock in the lakes that we have been hearing about today, as well as potential long-term cumulative—longer than 1 year—effects are not addressed.

Nine, and finally, it has been suggested that—and evidently this is happening in Colorado, too, based on Miss Vickery's remarks that she just made, that in deciding whether a proposed source would adversely affect a class I area, the regulatory agency should consider the potential impact of that source alone, not its cumulative effect with other sources. This has been suggested in Wyoming. It's ludicrous. It contravenes the intent and the very definition of prevention of significant deterioration.

These problems and deficiencies evidence more than a need to clarify procedure.

Now, the PSD process is not perfect. I'd like to refer you to a comment that Doug Fox made, that consensus models are needed. Now, that was a very simple statement lost in the many other things that have been said. But what that indicates is that the model that is being used is not now a consensus model. So there are problems with the PSD process. But there are also problems that cannot be addressed through even revisions of PSD as it now stands. In other words, contributing elements outside the scope of PSD.

We believe prompt action by Congress is needed to ensure that acid deposition damage to class I areas is prevented, which is what the Clean Air Act intends.

So what are the options? We could simply stop permitting new sources until all the necessary baseline data and accurate predictive tools are available, but I think it is obvious to all of us that that is not an economically viable approach.

We could set a regional cap on emissions equal to current levels, and permit new development only with offsets or as the natural attrition of old facilities allows. This, too, is unacceptable—probably to industry, certainly in the West where sources are newer and the attrition rate is not going to help us—but it's also unacceptable to those who believe that current pollution levels are already causing environmental impacts, such as the springtime acidification in certain California and Colorado lakes.

But there is a third alternative which we believe is both workable and fair. It involves first, and absolutely essential, cleaning up or shutting down the Phelps Dodge and Magma smelters. This will reduce the regional pollution, alleviating existing impacts and providing a cushion for future growth in the West.

Second, the Nacozari and any future Mexican smelter or smelter expansion must be equipped with SO_2 controls, and before going on line.

Third, new trucks and buses must be equipped with NO_x controls similar to those required for automobiles. The best available NO_x control technology should be required on new major stationary sources, as best control technology is now required for SO_2 on those same sources.

NO_x increments must be established.

And finally, the Clean Air Act should be amended to strengthen and clarify class I protection language and to provide a mechanism for remedying class I impacts should they occur, and we heard evidence on that subject from Governor Herschler's testimony earlier.

The costs of these measures are reasonable, not inexpensive but reasonable, and particularly when compared to the ultimate costs of doing nothing. Failure to spend whatever it costs to prevent acid deposition damage in the West could result in exorbitant losses later to the recreation, tourism, and forest products industries, and immeasurable impact to fish and wildlife habitats, soils, and aesthetic values.

Fiscal conservatism in this case, as it often does, demands an up-front investment to avoid possibly irretrievable losses later.

Finally, we must not be deluded by industry officials, scientists, regulatory officials, or anyone else who advocates inaction on the basis of all the uncertainties and complexities in this issue. If we wait until we have all the answers they say we need, the questions will be moot.

Senator HART. Miss Beck, thank you for an excellent statement, along with the other witnesses on this panel. We do thank you for your presence and your patience.

On behalf of the Environment and Public Works Committee of the U.S. Senate, I want to thank all those who have participated here today. From our elected public officials, we have learned the need to prevent acid rain from damaging the historic values of our unique region. They have put forward, in the testimony of Governor Lamm, certified by Governor Anaya, an agenda uniformly backed by those Governors for enforcement of existing laws and enactment of new conditions that will prevent acid rain from damaging those values.

We have heard from Agency officials and the scientific community that we are today operating under a situation of limited data, that there is some evidence of the presence of acidity in our ecosystems and our environment, but little evidence of current damage. No real picture of where we might be headed if current practices continue.

We have heard from business and energy representatives from that community that a balance of public policies is needed to protect the environment on the one hand, but to protect economic growth and expansion and opportunity on the other, and that, particularly, there needs to be a policy of choice of strategy on the part of the private sector as to how reasonable environmental restrictions are to be met.

Finally, from an array of those representing the environmental community and citizen organizations, we have heard particular testimony about the impact of smelters in the Southwest of this country, not only on the immediate area, but on perhaps a wider region as well; that perfect knowledge isn't necessary, as Miss Beck has said, before action can and should be taken; that there is existing authority that needs to be implemented by Government agencies; and that some new action may be required by the Congress and the administration.

I think, finally, just a couple of observations. One, we are dealing here with an international problem, but an international problem

that is beginning to affect this region so vital to us and to our neighbors.

Two, that for those who may be concerned, hearings of this sort could lead to the conclusion that Colorado and the neighboring States are not worth visiting anymore, that we need to dispel that notion. We are here today not to talk about existing gloom and doom, but rather prevent that gloom and doom from happening. We have an enormous amount to offer the people of this country and the world, and what we want to do is prevent those values and traditions from being eroded.

We have to remind ourselves always that there is a cost of pollution, that the discussion of "we can't do certain environmental programs because they cost too much" neglects the obvious counter-response, that not to act incurs cost to our society—material costs and, as some witnesses here today have said, spiritual costs as well.

We have some information but we need more. We need it from the scientific community particularly, and those of us in public positions have to provide the resources for that.

I believe and hope that the Environment Committee of the Senate, and the administration, will, in the next weeks and months and years, take the steps necessary to protect this valuable region from the damages of acid rain and other pollution and to correct the damages already done in other parts of the country.

The patience of the chairman is exceeded only by the patience of all of you here, and particularly our witnesses. On behalf of the committee, I thank all of you.

This hearing is adjourned.

[Statements submitted for the record follow:]

STATEMENT OF
GOVERNOR RICHARD D. LAMM
STATE OF COLORADO
TO THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
Denver, Colorado
August 12, 1985

Mr. Chairman, I appreciate the Committee's interest in acid rain in the West. I hope that this hearing will help dispel the myth that acid rain is solely an eastern problem.

While it is evident that acid rain is occurring in Colorado and other western states, it appears that if we act now damage from acid rain in the west can be prevented. It will be an enormous American tragedy if we fail to heed the warnings of severe acid rain damage in Scandinavia, Canada and the Northeastern United States in time to avoid the acidification of our precious western resources.

ACID RAIN IN COLORADO

Throughout this statement the term acid rain will be used to refer to all types of acid deposition including snow and dry deposition.

Acid rain of pH of 4.6 - almost 10 times more acidic than normal (5.3 - 5.6) has been measured in Colorado. Precipitation at sites in western Colorado averaged between pH 4.7 and pH 5.0 from 1981 through 1984. This data indicates that acid rain is falling over most of the Western Slope of Colorado. Both the pH of rain and snow and the amount of acid pollution which is entering high country lakes is near or above levels that have caused the death of lakes in Scandinavia. While precipitation acidity in the East is two to four times greater than in the West, the Western ecosystems are much more acid sensitive.

WESTERN SENSITIVITY TO ACID RAIN

Many people picture Colorado as having highly alkaline soils which would provide great buffering capacity for acid rain. While this is generally true for the eastern plains, the high mountain regions of Colorado are totally different.

The pristine lakes in the high country of the Rockies are among the most acid sensitive environments on earth. The Rocky Mountains cradle more than 7,000 high altitude lakes. Many of the lakes are on granite bedrock, surrounded by glacial walls which provide very little acid buffering capacity. Many are so vulnerable to acid pollution that 1/10 the amount of acid could cause as much damage as has been found in Northeastern lakes.

Before the acidity of a lake increases to the point of ceasing biological activity, the buffering capacity must first be consumed. Studies in the Rockies indicate that this buffering capacity is being consumed. If declines in buffering capacity continue, some lakes could begin to die.

Snow traps acid pollution for up to 9 months and then releases it into lakes over a short period of time. This results in lakes being 70 times more acidic during snow melts than the annual average. During the last two snowmelts lakes adjacent to the Snowmass Wilderness were found to have a pH of 4.9. To compound the problem, the increased acidity from snowmelt occurs at the same time as many species are in their most sensitive stages of growth. In 1983 and 1984, biologists found populations of trout and salamanders in high country lakes which failed to reproduce. Experience in the Adirondacks tells us that that the failure of these acid sensitive species to reproduce is one of the early symptoms of acidification.

Fortunately, scientists have not yet found dead lakes in the Rocky Mountains. But given the decrease in buffering capacity and the projected increase in emissions of acid pollutants, dead, acid lakes may not be far away.

Given the increased recognition of the Western acid rain problem, consideration should be given to expanding S. 53 to include the initial steps of a Western acid rain control program.

Smelters. The first priority for reducing acid rain in the west is to reduce emissions from smelters. In the intermountain region non-ferris smelters account for about 70% of the total sulfur emissions. I am sure that Governor Anaya will discuss the smelter issue in greater detail, but I would like to express my strong support for requiring the Phelps Dodge smelter at Douglas, Arizona to comply with the state's implementation plan by the 1986 deadline. I would also like to state my opposition to the operation of the Nacozari smelter in Mexico without emission controls. Without controls this smelter's emissions will be so great that it will negate much of the emission reductions which have been made in the United States. This would allow current sulfur deposition rates to continue, thereby continuing the threat of acid damage to sensitive lakes, regardless of our own regulatory efforts.

Nitrogen Oxides. Most scientists agree that emissions of nitrogen oxides (NOx) are a much more important if not the dominate source of acid rain in the West as contrasted with sulfur emissions in the Northeast. Federal studies project that NOx emissions in the west will increase very significantly. Several actions are needed to prevent these increases from occurring and to reduce emission to below current levels.

First, the existing NOx standard for automobiles must be retained. In urban areas, such as Denver and Grand Junction, automobiles are the primary NOx source. Second, stringent standards for NOx emissions from light and heavy-duty trucks must be implemented. Despite their relatively small number, trucks account for one-half of the total NOx emissions in Colorado.

Third, strict emission controls must be required on new stationary sources. Prior to June 1985, no source outside of California had been required to use NOx control technology. Last month, the Environmental Protection Agency made the precedent setting decision to require an oil shale plant in Colorado to implement technology which will achieve more than a 80 percent reduction in NOx emissions in order to protect the adjacent Flat Tops Wilderness Area from acid rain. All major new sources of NOx which may impact acid sensitive areas should be required to employ best possible control technology.

Fourth, a NOx increment should be added to Prevention of Significant Deterioration (PSD) program. The existing SO_2 increment has proven to be a valuable tool in limiting sulfur emissions. A similar tool is needed to restrain regional loadings of NOx. An NOx increment is needed as soon as possible since many major new sources are in the permitting process, even though they may not be built for a number of years.

Deposition Standard. Ultimately, acid damage will be avoided only if the rate of deposition is not above the amount which vulnerable ecosystems can safely tolerate. It is clear that the existing control technology requirements and the ambient emission standards under the federal Clean Air Act are not sufficient to prevent severe acid rain from occurring. Consideration should be given to the development of a deposition standard which would limit the amount of acid causing pollutants to levels below which acid rain damage would not occur.

Acid rain not only threatens our high altitude ecosystems, but may also present a danger to human health. Higher acid content in rain and snow has the potential to leach toxic materials from the Rocky Mountain states' highly mineralized terrain. This directly threatens the quality of domestic water supplies. With acid rain now occurring at the headwaters of the drinking water supplies for millions of people in the southwestern states and Mexico, this is an issue which cannot be ignored.

We thus have before us the opportunity to prevent potentially severe and irreversible damage to the pristine ecosystems which led the Indians to name this state "colorful land". Will we protect this spectacular heritage for future generations or will we let our high mountain lakes become acidified monuments to our shortsightedness?

OUTLINE OF A WESTERN ACID RAIN STRATEGY

We do not have all the answers about acid rain in the west, but the danger to our high mountain lakes demands that we act immediately to minimize the major sources of acid rain. Immediate action can diminish this mounting danger in the West and minimize the costs of doing so.

In 1983, the Western Governors Association (then WESTPO) adopted principles for a national acid rain program. These principles were incorporated in S. 768 as adopted by the Committee on Environment and Public Works in the last Congress and reflected in S. 53 which Chairman Stafford introduced this session. The principles, which remain timely, call upon Congress to adopt a program which:

1. Encourages the most cost-effective emission reductions;
2. Relies primarily upon states to implement emission reductions;

3. Does not impose nation-wide costs while providing only regional benefits;
4. Recognizes regional differences in size and type of emissions, climate and topography; and
5. Minimizes emissions from new sources through the application of best available control technology (BACT).

Currently, Colorado is taking a leadership role in the Western STAR (States Acid Rain Project). Rather than competing for STAR monies, twelve western states have joined together on a single project to develop acid deposition control options.

We are also beginning a process to establish state visibility standards.

RESEARCH NEEDED

While we cannot afford to wait to act until all the pieces of the puzzle are in place, increased acid rain research in the west is desperately needed. Acid rain in the west appears to be distinguished from acid rain in the east in at least three important respects:

1. Western ecosystems are much more sensitive to acid damage than those in the East;
2. Nitric oxides rather than sulfur oxides may be the dominate acid rain precursors; and
3. Dry deposition may play a much larger role in Western acid rain than in the East.

Currently, federal monitors are not located in the high altitude regions of Colorado which are most sensitive to acid damage. In addition the Western terrain and meteorology makes predictive models much more complex.

The federal research program must be reoriented to address these Western issues as well as to develop adequate base line data on the current degree and extent of acid rain and lake acidification in the west. Research is also needed to better understand the potential in-state and distant sources and transport mechanisms of Western acid rain such as power plant and mobile source emissions. Further, coordination of existing research efforts is needed to most effectively utilize the knowledge we are gaining while we still have the time to make the best use of it.

My Science and Technology Advisory Council is in the process of developing a detailed acid rain research agenda for Colorado. I would like to provide these research needs to the Committee when it is completed.

CONCLUSION

A clear and present danger to high altitude lakes has been identified. Acid lakes need not be the price of growth in the West. Reasonable strategies are at hand to prevent acid rain damage in the West. The question remaining to be answered is whether we have the will to act before it is too late.

STATE OF NEW MEXICO
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TONEY ANAYA
GOVERNOR

TESTIMONY
OF NEW MEXICO GOVERNOR TONEY ANAYA
BEFORE THE U.S. SENATE ENVIRONMENT
AND PUBLIC WORKS COMMITTEE

WESTERN ACID RAIN HEARINGS
DENVER, COLORADO
AUGUST 12, 1985

Good morning. As Governor of the State of New Mexico, I am honored to take this opportunity to share with this committee my serious and growing concerns about acid air pollution in the Southwest, particularly in regard to long-range transport of massive sulfur dioxide emissions from copper smelters in Douglas, Arizona, in Cananea, Sonora, and soon in Nacozari, Sonora.

Only thirty miles upwind from New Mexico, the giant copper smelter in Douglas, Arizona, the largest single source of airborne sulfur dioxide in the western United States, continues to spew its acid pollution with no sulfur dioxide emission controls and with frequent exceedances of the federal Primary Health-Related National Ambient Air Quality Standards for sulfur dioxide. Although expected to close no later than January 1, 1988, when the Nonferrous Smelter Order (NSO) provisions of the Clean Air Act expire, another congressional extension is a dangerous possibility which we strongly oppose.

Of further concern, EPA's recently published Nonferrous Smelter Order Regulations contain serious ambiguities regarding the finality and enforceability of that "final" date. They leave substantial doubt regarding regulatory requirements upon the smelter operator to show that the smelter will be operated in a manner consistent with the clear mandate of the Clean Air Act not to violate the applicable standards. Additionally, EPA's new regulations would also appear to allow the administrator unrestrained discretion to delay the NSO process indefinitely while staying any national ambient air quality standard maintenance and protection requirements or any enforcement processes in the interim. To emphasize New Mexico's concern over the impact of the Douglas operation, I authorized the intervention by New Mexico in the appellate review of EPA's recent NSO regulations.

In the meantime, sixty miles south of Douglas, Arizona, at Nacozari, Sonora, under a 932-foot-tall stack, a new "world-class" copper smelter even larger than the Douglas smelter is nearing completion this year or early next year with no acid pollution controls whatsoever. Another Sonoran copper smelter at Cananea, forty-five miles southwest of Douglas, is currently

operating without sulfur dioxide controls and is emitting 380,000 tons of sulfur dioxide per year. We are concerned that if it should expand that pollution controls be guaranteed.

It is certain that the present emissions from the Douglas smelter frequently create massive pollution conditions in that area of Arizona and in Sonora. Additionally, there is no doubt that long-range transport of this acid plume occurs regularly into Mexico and New Mexico. Now, with new studies and other evidence developing daily, it is becoming increasingly certain that this same pollution is carried aloft across Mexico, New Mexico, Arizona and into Utah, Colorado, Nevada, Wyoming, Idaho and possibly Southern Canada. Without comprehensive efforts now by the western states, and the governments of the United States, Mexico and the State of Sonora, this massive acid air pollution will double in the next few years as the gray triangle of Douglas, Nacozari and Cananea comes into full, uncontrolled operation. For this reason, I recently called upon our Congressional delegation to support EPA's efforts to negotiate immediate implementation of controls on Mexican smelters with the Mexican government. The clear support of the U.S. Congress would also be extremely helpful.

I am heartened by the recent agreement between the United States government and the Mexican government regarding control of sulfur dioxide emissions from the Nacozari smelter, by January 1, 1988. I strongly urge continued negotiation leading to more stringent and earlier control of sulfur dioxide emissions from the Nacozari smelter.

Because of the types of information we now have and which are now the focus of most media coverage and impact-related research, I am deeply concerned that serious harm to many areas in our state will go neglected and undetected until too late.

As a recent World Resources Institute report indicates, the present high-profile acid air pollution concerns in the west are focused on extremely sensitive mountain environments, and in particular, on the impacts on forest, mountain lake and stream ecosystems. The primary early indicators of acid damage in Scandinavia, Europe and the eastern United States are:

1. Increasing acidity of rain and snow;

2. Increasing acidity of runoff into streams and lakes;

3. Reduced buffering capacity in streams, lakes and soils; and

4. Significant early stage biological damage due to the extreme sensitivity of certain species of aquatic plants and animals and certain terrestrial plants and animals.

Clear evidence of all four indicators now exists in several mountain areas in the western United States. The U.S. Fish and Wildlife Service has found acidified lakes during spring in the Rockies. Lakes adjacent to the Snowmass Wilderness in Colorado were found to have a PH of 4.9 for a month

during snowmelt. Snow traps acid pollution for more than six months each year and then releases it into lakes in the spring. The Rockies contain more than 7,000 high mountain lakes set in granite bedrock with little buffering capacity. Studies in the Rockies also indicate that the already low buffering capacity of lakes is being consumed. If the buffering capacity of these lakes continues to decrease, some lakes could become sufficiently acidic to threaten trout and other lake species. These limits may have already been reached in the San Juan Mountains of southwestern Colorado. Research biologists have reported finding trout and salamander populations in 1983 and 1984 in high western mountain areas, which have been unable to reproduce successfully. For salamanders this failure could be related to acidic snowmelt occurring during spring egg hatching. We must prevent what has occurred to Scandinavian and eastern U.S. lakes from occurring to western lakes.

Unfortunately, virtually all of the knowledge we have from other regions in the world is almost exclusively applicable to our high mountain environments. Almost nothing is known about effects of dry acid deposition or dry, suspended acid air pollution in the arid regions of the southeast. The World Resources Institute report emphasizes that because of the limitations of present knowledge, we can clearly identify areas at risk only if those areas are subjected to acid rain or snow while areas subject primarily or almost exclusively to dry deposition and dry suspended acid air pollution cannot be well evaluated at present. Thus, the report limits its identification of areas at risk only to geographic areas where altitude and meteorology indicate a combination of potential acid air pollution transport with large amounts of precipitation in mountain forest and stream environments. The unfortunate implication all too frequently but mistakenly expressed in press releases and news reports is that the remaining semi-arid and desert areas are immune, although the World Resources Institute report strives to prevent that serious error.

To proceed on the presumption that other drier, lower elevation regions are immune from acid air pollution could very well be disastrous. The World Resources Institute report contains clear warning that the arid regions in the West must be given close attention in addition to our beautiful mountain country. For example, in the Los Angeles basin, the rate of dry deposition to acid rain has been measured at ratios of fifteen-to-one, fifteen times greater than the one-to-one ratio which characterizes the much more moist eastern U.S. With such ratios in Los Angeles, which has much more precipitation than may areas in the Southwest, extremely high levels of dry acid deposition and suspended atmospheric burdens will almost certainly be occurring in highly valued locales such as the vast high country of the Gila Wilderness in southwestern New Mexico, which is close to and often downwind from the Douglas Smelter. At greater distance in New Mexico, both the Jemez and Sacramento mountains, for example, harbor rare and endangered species of salamanders, among the most sensitive animals to acidification of aquatic environments. Sensitive amphibian species in southern Arizona and Mexico are already vanishing. Yet none of these areas have been recognized as sensitive or at risk. Without doubt, both research and regulatory efforts to understand and protect arid, semi-arid and remote desert mountain environments must receive immediate and emphatic support.

The direct and dangerous relationship of tall stacks to regional acid air pollution is also of very serious concern. Two general approaches to protecting the local ambient atmosphere from violations of the federal standards are commonly applied, often in some combination. One method requires emissions reduction through pollution capture technology or other modifications in the underlying process technology. The other method focuses on dilution of the pollution by using tall stacks to project the emissions high into the atmosphere. The giant smelter nearing operational status in Nacozari, Sonora, is a prime example of the tall stacks problem. The modern smelter technology will result in vast quantities of highly concentrated sulfur dioxide emissions with no emissions reduction control technology. The smelter is also located in rugged terrain with nearby high elevations, which can interfere with pollution removal unless excessively high stacks are used. The consequences is a 960 foot tall stack projecting a highly concentrated, uncontrolled acid plume high in the atmosphere, resulting in long-range transport and broad regional pollution. Clearly, for sources emitting acid air pollution, when tall stacks are used rather than emissions reduction technology, much greater long-range transport occurs along with highly intensified atmospheric burdens of acid air pollution. Thus, as with visibility protection, the use of tall stacks is inconsistent with environmental protection from regional acid air pollution. Legislation and regulation to curtail regional acid air pollution and visibility degradation must require emissions reduction technology and must minimize the use of tall stacks.

Southwestern industries are at the forefront of acid air pollution control in the United States. The Kennecott-Mitsubishi renovation of the entire Santa Rita/Hurley, New Mexico copper mine, mill and smelter now stands as a world benchmark of cost-efficient copper production and pollution control as is the renovation at Kennecott's Hayden, Arizona, smelter. The Phelps-Dodge smelter at Playas, New Mexico, constructed in the 1970's, also utilizes effective modern controls. Public Service Company of New Mexico and Arizona Public Service Company have taken extraordinary steps to reduce acid air pollution in the Four Corners area. The recent completion of the Arizona Public Service Company Four Corners sulfur dioxide control system and Arizona Public Service Company's continuing research into the world-wide state-of-the-art of powerplant nitrogen oxide emission controls further epitomize acid air pollution control efforts in New Mexico. However, these efforts will not be enough.

While many industries in the southwest spend many millions of dollars on pollution control, one giant smelter in Arizona and smelters in Sonora may overwhelm all of the environmental benefits achieved through these industries' efforts. These uncontrolled polluters gain extremely unfair competitive advantages by escaping the costs of pollution control. Furthermore, smelters in Mexico have no incentive to place expensive controls on new or renovating operations to protect U.S. air as long as one U.S. smelter escapes the costs and pollutes the Mexican atmosphere.

The Southwestern economy and Southwestern industry have incurred great costs and will continue to invest heavily in cleaning up acid air pollution.

Additional efforts are necessary in the Southwest, as well as the remainder of the country.

In order for control of acid air pollution to be realized, several approaches must be taken simultaneously.

First, with respect to the copper smelter pollution from both Douglas and the Mexican smelters, the Douglas smelter must be brought into full compliance with both Arizona public health protection requirements and the Nonferrous Smelter Order provisions of the Clean Air Act. This responsibility falls principally on the state of Arizona and the U.S. Environmental Protection Agency. EPA's Nonferrous Smelter Order regulations must be applied immediately to require comprehensive protection of the national primary air quality standards through an adequate supplementary control system or, if necessary, shutdown.

Second, the negotiations with Mexico must proceed on a fair and realistic basis. Nacozari must not be allowed under any circumstances to begin operation without adequate control technology. This is primarily the responsibility of the U.S. government and the government of Mexico.

Third, all new facilities, large and small, which emit sulfur dioxide or nitrogen oxides must be required to use best available control technology. This will become especially critical for nitrogen oxide sources in the coming years. Best available retrofit technology requirements under state and federal visibility plans must be expanded and stringently enforced. Tall stacks regulations must address regional issues in an equal basis with local ambient analysis.

Fourth, I would suggest that acid rain legislation which addresses Western issues should consider the following recommendations:

* Change language in the Clean Air Act to state that second Nonferrous Smelter Orders must contain increments of progress for achieving compliance by January 1, 1988; change Clean Air Act language to ensure that Nonferrous Smelter Order extensions are limited to January 1, 1988, under Section 119 of the Clean Air Act; require that a Nonferrous Smelter Order be revoked if a smelter violates the Primary, Health-Related National Ambient Air Quality standards.

* Reduce 10 million tons of sulfur dioxide nationwide;

* Direct EPA to determine if current sulfur dioxide increments for prevention of significant deterioration should be made more stringent;

* Direct EPA to determine if nitrogen oxides increments should be added to the federal prevention of significant deterioration regulations;

* Direct EPA to determine if more stringent nitrogen oxides control technology should be formulated for new source performance standards;

* Reduce nitrogen oxides emissions from new light and heavy trucks;

* Fund adequate research on acid deposition impacts in the Western states;

* Establish enforceable north American agreements on large sulfur dioxide sources like the Nacozari smelter in Sonora, Mexico; and

* Require state implementation plans to address the total amount of acid deposited into sensitive watersheds so that water quality standards already adopted under the Clean Water Act are protected.

Clearly, it is time for the Congress, the EPA and the entire nation to recognize not only the benefits but the responsibilites of economic growth involving industries which contribute to regional acid air pollution. It is also time for the country to recognize that acid rain is a national problem and not merely a regional issue.

I look forward to working with Congress, the EPA and the Western states to remedy the growing acid air pollution problem in the West before our unique and diverse mountain and desert ecosystems and our clean air are destroyed.

HOUSE OF REPRESENTATIVES
WASHINGTON, D.C. 20515

TIMOTHY E. WIRTH
2nd District, Colorado

STATEMENT OF REP. TIMOTHY E. WIRTH
SECOND DISTRICT - COLORADO

BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
U.S. SENATE

DENVER, COLORADO
AUGUST 12, 1985

I am delighted to be with you today to share my perspectives on the potential threats which the acid rain phenomenon pose for the Western states -- especially those within the Intermountain West.

It is appropriate that the Committee has selected Denver as the site of this field hearing on the western acid rain problem. Just a matter of minutes from here, Denver's Stapleton International Airport serves as the disembarkment point for thousands of annual visitors to the West. And just west of our locale is the attraction which lures those thousands here, the grandeur of the Rocky Mountains -- their pristine lakes and valleys, unmatched scenic beauty and precious wildlife habitat. That beauty is certainly a treasure which all Coloradans hold at the very center of our vision of our state -- a vision which defines our heritage, our lifestyle and our commitment to preserve this precious land for future generations.

Just as those natural wonders help define the character of the West, they also play a paramount role in shaping our very economic existence. Our parks and forests provide endless opportunities for camping, hiking and the exploration of nature's wonders. Our lakes, streams and habitats offer unmatched variety for the hundreds of thousands of sportsmen who annually test the challenges of our mountains. Our miles of rivers support a burgeoning white water sports industry. And our world famous ski areas and acres and acres of untracked powder offer an unparalled spectrum of winter sports activities.

Taken together, the opportunities afforded by the Rockies have served to make Colorado's tourism and recreation industries one of the most stable and dynamic sectors of the State's economy.

In 1984 alone, the state estimates that 16 million tourist visitor days yielded $4 billion in additional spending throughout the state -- directly creating 100,000 jobs and generating approximately $500 million in additional tax revenues. And new estimates issued just this week indicate that the record pace of 1984 could very well be surpassed this year.

I point to these attractions of the Rockies -- both psychic and economic -- to underscore a sobering reality. Almost nowehere in this nation than in the Intermountain West does the specter of acid rain and its associated environmental degradation portend greater danger to the well-being of our citizens and our environment. The simple fact is, as the acid rain phenomenon emerges in the West, it is incumbent upon us to take action <u>now</u> to control it. If we fail to react swiftly, at some future point we will be faced with the dead lakes and streams, deforestation and loss of habitat which already plagues countless ecosystems throughout the Northeast, Canada and Europe.

The national debate over acid rain has focused virtually exclusively on the 31 states east of the Mississippi River where the stark realities of the acid rain danger have been manifested. When that debate has taken on a truly national focus, it has been directed at the question of how best to finance the reductions in sulfur oxide loadings emanating from the Ohio Valley which are the priciple contributor to the damage we have found in the Northeast. Many have proposed assessing the costs of cleaning up the sources of these loadings directly on the industrial interests responsible. Others have advocated that a national surcharge be assessed on power generation to create a fund for the clean-up of Midwestern sources.

Regardless of the financing approach adopted, Westerners will ultimately share in the costs of combatting the Northeastern acid rain problem: either directly through a surcharge on electricity, or indirectly through increased prices for the goods and services provided by the subsidiaries and related companies of the various midwestern industrial interests who would bear direct financial responsibility. If we in the West are to share in the financing of cleaning up the sources of the Northeastern problem, it is perfectly reasonable that we should also gain a return on that investment. That return must be an assurance that steps are taken today to ensure that the acid rain problems of the Northeast are not allowed to develop in the West. Put simply, any national acid rain control program must be just that: national in scope.

Those who oppose taking immediate steps to combat the growing acid rain problem argue that the uncertainty surrounding cause and effect necessitates further research in lieu of action. While there is certainly little substitute for greater certainty wherever practicable, the evidence demonstrating an emergence of acidification throughout the Intermountain West compels us to take immediate control actions at the same time that further research moves forward. Many of the witnesses appearing today will testify in great detail about the evidence which already exists demonstrating that the initial process of acidification is underway in the West.

Over the past four years, increasing numbers of scientists have pointed to the potential for acidification throughout the fragile ecosystems of the Intermountain West. The region bounded by the Continental Divide on the East and the Sierra Nevadas on the West is home to areas among the most spectacular and pristine in our nation. The region is the very symbol of our western heritage and we have acted wisley to preserve these natural gifts wherever feasible. The jewels of those gifts are, of course, our many wilderness areas, wildlife refugees and national parks. Yet, those very same treasures are the most vulnerable to the degradation which can be created by acid rain. The high alpine areas of the Rockies host nearly 7,000 lakes and the headwaters of countless streams and rivers. Many of these lakes lie atop granite bedrock and are found in areas with little or no natural cover -- all of which serves to provide little natural capacity to neutralize acids.

Our wilderness areas, wildlife habitat and parks are the foundation of the natural treasures to which I spoke earlier -- the treasures which serve as the base of our growing tourist and recreation economy. That this foundation is also the precise area of the West most at risk from acidification suggests the very real long-term dangers we face if we take no action to protect these areas. Recent evidence suggests that we had best get about that action.

Earlier this year, the U.S. Forest Service reported that 21 of 22 lakes studied in the San Juan Mountains of Colorado are experiencing a marked decrease in pH levels. The studies prepared by the Environmental Defense Fund, the World Resources Institute and researchers at the University of Colorado at Boulder suggest that similar evidence of initial acidification is widespread throughout the Rockies. We have been told that increases in acidity have been found throughout the lands within and adjacent to our wilderness areas -- from the Snowmass, Mount Zirkel and Flattops Wilderness Areas on the western slope to here along the Front Range in the Indian Peaks Wilderness Area in western Boulder County. This past week, the National Clean Air Fund revealed that sampling data (as yet unreleased) compiled by the Environmental Protection Agency indicates that far more areas than we originally suspected may be vulnerable. What is apparent is that as our investigations continue and as our certainty about the extent of acidification in the West grows, so too does the evidence that large expanses of the region are at risk in the absence of actions to control the sources of acid-forming pollutants.

Fortunately, we are presented with a great deal of certainty as to the sources largely resposible for the growing western acid rain phenomenon -- a degree of certainty which allows us to take immediate steps today to begin to control the threats which have emerged. At a minimum, we must act to control the emission of sulfur oxides (SO_2) from smelters located throughout the southwest and Mexico and emissions of oxides of nitrogen (NO_x) from mobile and industrial sources.

It is estimated that some 70% of the total SO_2 loadings found within the Intermountain region emanate from smelters. Yet, the 1977 amendments to the Clean Air Act granted an exemption for that industry from full compliance with clean air emissions limitations until 1988. Above all else, bringing our domestic smelters into compliance with the limitations mandated by the Clean Air Act must be our number one priority.

Since those amendments were adopted in 1977, progress towards reducing smelter emissions has been made. Presently, all but two domestic smelters within the region are operating in compliance with emissions limitations or have agreed to do so. Unfortunately those not in compliance -- the Phelps Dodge and Magma facilities, located in Douglas and San Manuel, Arizona respectively, -- account for an estimated 30-35% of total SO2 emissions in the region. Bringing those two sources under compliance will yield significant decreases in total SO2 loadings in the Intermountain West.

Industries throughout the West -- our powerplants, our mines, and our manufacturing facilities -- are among the leaders in this nation's installation of "state-of-the art" control technologies, in most cases at significant financial sacrifice. We are proud of the commitment that western industry is making to the ongoing protection of the quality of our air and lands.

It is time to ensure that all interests play by those same rules. While we must certainly remain sensitive to the economic downturn in the smelting industry, continued exemptions from the Clean Air Act for smelters makes no sense from either an environmental or economic standpoint if such sources will continue to threaten many of the areas which provide for so much of our economic and environmental well-being.

During consideration of the reauthorization of the Clean Air Act in 1982 by the House Energy and Commerce Committee, I strongly opposed a continuation of smelter exemptions. I won the support of my colleagues on the Committee not to support extensions beyond 1988. Likewise, the package of amendments to the Act offered by Congressman Waxman and myself last year also would have ensured that smelters were brought into compliance by 1988. Unfortunately, in each case that important policy objective was stymied by the overall reality of special interest after special interest -- including the smelter industry -- seeking preferential treatment and revisions to the Act which would have seriously jeopardized our ongoing clean air efforts. That outcome, however, must not deter us from continuing to press for this action so vital for the West.

Looming across our southwestern border with Mexico is the huge Nacozari smelter, scheduled to go into operation later this year. That facility is currently configured with no emission controls in place and is expected to contribute an additonal 500 tons of SO2 to our region annually. Just as we must seek to control domestic sources of SO2, so too must the U.S. take an aggressive posture in our negotiations with Mexico about the level of emissions controls which should be placed on these foreign sources. Many of us in the Congress, including you Senator, have been in continuous contact with the White House, the State Department and the EPA demanding that action be taken. In absence of a tough negotiating posture with the Mexican government demanding that adequate controls be placed on these new sources, we do nothing but a disservice to both our domestic smelter industry and to our overall goals of environmental protection.

Just as we must get tough on smelter SO2 emissions, so too must we continue to press for tough controls on the emission of NOx from automobiles, light and heavy-duty trucks, and industrial sources. Controlling SO2 emissions is only half of the battle we face in seeking to prevent the spread of acid-forming pollutants throughout the West. Just as sobering as the projected future loadings of SO2 from unrestrained domestic and foreign smelters are the projections for increasing inventories of NOx throughout our region. New powerplants, a presently uncertain shale industry, and continuing growth of mobile sources will all yield additional loadings of NOx throughout the West in the next 10-15 years. In each instance, we have an obligation -- for the sake of environmental protection and to maximize our growth opportunities -- to require effective levels of control on new and existing sources. The degree to which we succeed in limiting emissions of NOx will in large part determine our success in ensuring other growth opportunities.

Earlier this year, the EPA, after years of delay, promulgated tailpipe emission standards for light and heavy-duty trucks. While considerable evidence suggests that these standards may in fact be too lenient, the promulgation of even an initial standard is certainly a step in the right direction.

But lest we think that the battle to control auto emissions in the West is won, let me remind you that the auto industry continues to seek actual revisions of tailpipe standards for vehicles operated at high altitudes, such as Denver, which would achieve nothing less than undermining any minimal progress we might attain through these tentative first steps. That is a fight which we cannot afford to lose.

In 1982, we succeeded in defeating the coalition of special interests seeking changes including those sought by the auto industry, and were able to table legislation which would have jeopardized the efforts of Colorado and other western states to protect the health of our citizens and the quality of our environment.

To stand guard against attempts to weaken the Clean Air Act is not enough. We must actively seek to strenghten the Act. Any such effort must include a national acid rain control program which addresses the problems of the Northeast and the West. That package must also include initiatives to control the release of dangerous and cancer-causing chemical gas emissions into our air -- initiatives similar to legislation I have introduced in the past two Congresses requiring the EPA to establish national emission standards for 83 potentially dangerous chemicals and to set stringent tailpipe emission standards for diesel particulates which contribute to phenomenon like Denver's "Brown Cluod".

The challenge we face in crafting a western acid rain control program is to be both decisive and balanced. Bringing domestic smelter emissions under control, securing the cooperation of our Mexican neighbors, and guarding against severe increases in NOx loadings are the minimal steps which must be taken.

Simultaneously, we must develop policies which recognize that the West is a diverse and dynamic economic entity -- a region which will continue to experience growth and increased opportunities. These opportunities will come in many forms -- from new high technology pursuits; from a revitalized energy industry (which will ultimately become imperative as the current world energy market inevitably tightens); from the continued growth of our manufacturing interests; from the need for new sources of power and electricity to serve our increased populations; and from the tourism and recreation industries.

We can achieve a balance in the need to protect our western resources from the dangers of acid rain -- in the process protecting our tourism and recreational industry bases -- and in providing for continued growth and opportunity within other economic sectors of the West. But any such balance we attain will require the full participation of everyone.

That is the process of policy formulation to which I am committed, Senator, and I am certainly aware that this is the same course you have set in this pursuit. I look forward to reviewing the testimony of the many experts and witnesses appearing before you today as we embark on that mutual path.

Testimony for the Record

from

THE HONORABLE ED HERSCHLER

Governor of Wyoming

Hearing Before

The Subcommittee on Health and the Environment

United States House of Representatives

Committee on Energy and Commerce

"THE GROWING THREAT OF ACID RAIN IN THE WEST"

June 28, 1985

Albuquerque, New Mexico

I am pleased to submit this statement for the record of the hearing before the Subcommittee on Health and the Environment, held June 28, 1985, concerning "the growing threat of acid rain in the West."

Scientists have known about the occurrence of acidic precipitation for sometime, understanding it as a natural atmospheric "cleansing" process whereby acidic materials are deposited in wet or dry form on the earth's surface. Beyond this simple understanding much scientific uncertainty surrounds the phenomenon.

The possible adverse environmental consequences of this natural process have been recognized more recently, and have created much concern, study, and debate to resolve some of the scientific uncertainties. Even more recently concern about the potential problems of ecosystem damage from acid rain has moved to the western United States.

It is important to recognize that many of the air pollution sources which contribute to acidic deposition are carefully regulated under federal and state environmental laws. However, the presence of

high value, sensitive forest and wilderness areas, increased western industrialization, and certain unregulated air pollution sources have resulted in a growing concern that western resources may now be the new victims of environmental acidification.

I would like to clearly express Wyoming's position on this issue. Existing scientific data which has been reviewed by the State does not indicate an immediate threat to any Class I (wilderness) areas from existing emissions from Wyoming and elsewhere. However, we recognize the potential for damage to our Class I areas. Just as a man with a family history of heart ailments should recognize that he is potentially "at risk," the State realizes that some of its high elevation wilderness areas possess surface waters, soils, and vegetation which are susceptible to the influence of acidic deposition. However, while our pristine wilderness areas are sensitive and should be monitored, we do not serve the interests of Wyoming by succumbing to "environmental hypochondria" on the acid rain issue.

At this point it is appropriate to explain the course of action Wyoming has taken to address and minimize the potential threat of damage to our

sensitive areas.

For proposed pollution sources, the Air Quality Division of the Wyoming Department of Environmental Quality conducts an extensive review of the permit application, the baseline monitoring data, the proposed air pollution control technology, and independent Division modeling results to determine whether any standards would be exceeded or whether adverse impacts on air quality related values ("AQRV") in a Class I area would result from the facility. The AQRV determination evaluates impacts on acid deposition and lake water chemistry, vegetation, soils, and visibility. The most up-to-date scientific tools, including those recommended by the U.S. Forest Service are used to project these impacts.

Many of the assumptions used in these analyses are quite conservative and possibly overestimate the projected impact. A "worst-case" increase caused by the project is predicted and then judged against the "lowest suggested" threshold for acid deposition for the Wyoming lakes.

Facilities which have recently gone through this process have predicted pH changes well below

the sensitivity of state-of-the-art pH instrumentation and below the lowest-suggested threshold applied by the Forest Service. Furthermore, I believe the actual measured impact will be below the predicted levels given the effect of natural buffering and deposition before the plume reaches the Class I area. None of these conditions are assumed to exist by the Forest Service methodology, and they will all tend to reduce impacts.

While the State accepts the conclusions from the analyses described above for the permitting decision, we realize that techniques for projecting impacts from acid deposition are not well developed. The potential effects of variables such as cloud water, lake stratification, and acid shock from snow melt cannot be projected accurately. Therefore, post-permit monitoring is critical to characterize actual conditions in remote areas, and to guide future decisions which will continue to protect our sensitive resources.

A monitoring program including the State, the Forest Service, and two companies has been established through State permit conditions. The program consists of two National Acid Deposition Program (NADP) monitoring stations and four bulk monitors

in and near the Bridger and Fitzpatrick Wilderness Areas. As additional permit conditions, the State is requiring the installation of a visibility monitor and a continuous SO_2 ambient monitor. A dry deposition monitoring program, additional wet deposition monitors, and some form of cloud water monitor in the area may also be established through State requirements.

I also understand that the Federal government has taken the initiative for some monitoring in the area. The Forest Service is establishing a program that includes repetitive surveys of lakes and streams, as well as soil conditions and forests to seek evidence of environmental stress from acidic deposition. Additionally, the EPA will extend the National Surface Water Survey to include certain high elevation, western wilderness area lakes which are sensitive to acid deposition.

Finally, the question of inter-state transport of acid precursors is also a subject of State interest. We have required another company to install an additional NADP site near the Wyoming-Utah border. This monitoring station will provide data on the important question of interstate transport of acidic deposition.

While the State has permitted facilities which could potentially impact Class I areas, we have a process for "revisiting" the acid rain issue as necessary, depending upon the results of the monitoring effort. If and when it is demonstrated that Wyoming sources are causing adverse impacts to air quality related values in Class I areas, rulemaking can be undertaken to address all sources contributing to that impact. This process will be difficult. However, it is preferable to a process which attempts to attribute a particular proportion of a change in pH to a particular facility. All sources as a group will be addressed, with full and fair opportunity for each source to come forward with information about its individual contribution.

I have attempted to be thorough on Wyoming's approach to the acid rain issue in order to avoid a common pitfall in this area. It seems as though public awareness about acid rain is directly and inversely tied to pH value. In other words, as public awareness increases there is a tendency to conclude that the problem is worsening and nothing is being done.

While Wyoming has some initiatives underway, we would not suggest that more shouldn't be done:

-- Much more research and monitoring should be undertaken. The areas at risk are under federal stewardship. The federal government should assure that financial resources are available to protect its natural resources.

-- The federal government should take the lead in resolving certain basic research questions of importance to the West. There is much debate now over the accuracy of field data as opposed to "quality-assured" data from laboratory analyses. Water samples could vary dramatically in pH value depending upon the analysis technique used. In addition, the significance of NOx in the West is under debate. Some emphasis could be placed on this question from the western perspective. Finally, it has been suggested that the impact of dry deposition may be a more signficant issue to the West. However, certain reports conclude that monitoring techniques are in their infancy for this pollutant. Some effort could be placed in this area as a western topic of concern.

-- There is much debate and dialogue over

the effect of the start-up and operation of a major new Mexican smelter and an expected expansion of another nearby Mexican smelter. I continue to believe that action on the national level should be taken to persuade Mexico to require the installation of modern control technology on these two smelters before they begin operation. An enforceable agreement should be forthcoming to require controls for these smelters equilavent to those required on US smelters.

Along this same line, Congress should not extend the compliance deadline for the Non-Ferrous Smelter Industry. I must admit that reports on the effect of smelters in Wyoming are contradictory at best. One report suggests that over half of the acidic deposition experienced in Wyoming results from the non-ferrous smelters in the western United States. (EDF Report, November 26, 1984.) Another report concludes that the smelters are not major contributors to the measured sulfur deposition in Wyoming. (TRC Consultants, December 3, 1984.) However, given the relief that has already been provided under the Clean Air Act for smelters and the potential for increased acidic deposition, I believe the compliance dates should not be extended again.

-- Any acid rain bill considered by Congress should address the western acid rain issue separately, with funds for research directed to the different and complex issues surrounding the phenomenon in the West. In addition, given the potential for interstate transport of pollutants to adversely affect air quality related values within Class I areas, a process should be statutorily authorized for the EPA Administrator to require reductions from sources in one state which clearly affect AQRV's in another. The petition process of Section 126 could be a vehicle for such a proceeding and determination. However, it would have to be amended inasmuch as it now only prohibits emissions which prevent the attainment and maintenance in other states of Ambient Air Quality Standards and Prevention of Significant Deterioration increments. The process could be amended to bring in the AQRV protection for Class I areas and provide a remedy if the monitoring and research efforts disclose an injury.

I very much appreciate this opportunity to submit a statement on the acid rain issue in the West. Again, we do not believe that any sensitive area in Wyoming is suffering an adverse impact from acidic deposition. However, the sensitive areas clearly warrant federal and state attention and evaluation to help assure that damage does not occur from out-of-state sources and sources which we permit and regulate.

STATEMENT OF
JOHN MALANCHUK
ACTING DIRECTOR ACID DEPOSITION ASSESSMENT STAFF
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC

BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
DENVER, COLORADO
AUGUST 12, 1985

Good morning, Mr. Chairman, and Members of the Committee. My name is John Malanchuk, and I am Acting Director of the Acid Deposition Assessment Staff in EPA's Office of Research and Development. With me today is Larry Svoboda of our Denver Region VIII Office. Mr. Svoboda serves as manager of Region VIII's Acid Deposition Staff and serves as Coordinator of the Western Atmospheric Deposition Task Force. We are happy to be here today to represent EPA and to share with this Committee our perspective of the National Acid Deposition Research Program, its plans for conducting research in Western States, and the current state of our knowledge concerning acid deposition effects in Western ecosystems.

The Federal acid deposition research effort is managed through the National Acid Precipitation Assessment Program (NAPAP), of which EPA is a member, along with 11 other Federal agencies. NAPAP conducts research that is designed to reduce the critical scientific uncertainties in the acid deposition phenomenon. Our overall research strategy is to investigate the effects, sources and transportation of acid deposition and its precursors. For each major effect area, we are striving to learn the nature, extent and magnitude of current damage, and most importantly, the prospect for future damage. In the areas of atmospheric science, we are

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actively seeking an improved understanding of the physical processes involved and are incorporating this understanding into mathematical models that simulate both atmospheric chemistry and meteorology on regional and local geographic scales.

Our current FY 1985 and proposed 1986 programs emphasize improved understanding of the ecological effects of acid deposition and its precursors on forest and aquatics resources. I will speak about each of these effects in a few moments, but I would first like to speak briefly about how NAPAP and EPA have set their research priorities.

Our research on ecological effects has concentrated on three major priorities -- first, determining the extent and magnitude of current damages; second, developing the capability to predict the rate at which future damages might occur at current deposition levels; and third, projecting the response of various ecosystems if deposition levels were to change. The achievement of these goals has required the development of new and novel research approaches. Effective testing of these approaches requires us to apply them first to those areas of the country where damage is most likely to occur.

Once these approaches are refined and demonstrated to be effective, we can apply them to our full national effort. Additionally, from the standpoint of national policy development needs we have placed first priority on studying those areas most clearly threatened by acid deposition. These are areas where effects have been well documented or where we believe both deposition and potential sensitivity are at their highest. Lower priority has been given to those regions of the country which lack

well-documented damages from acid deposition and to areas which have only moderate levels of deposition and/or less sensitive resources. This has meant that the pursuit of specific research interests for many regions, both in the East as well as the West, has had to be of lower priority until we have a better sense of what can be learned through completion of research now underway. However, in both aquatic and terrestial effects, an orderly expansion of our research efforts is planned to include Western ecosystems.

To help facilitate and guide this expansion, EPA's Region VIII, under the leadership of Regional Administrator John Welles, has organized the Western Atmosphric Deposition Task Force. This Task Force, composed of Federal, State and private agencies involved in various ways with research or management of atmospheric deposition, serves as a central clearing house for identifying research needs and priorities of the Rocky Mountain West. The Task Force not only works to help support NAPAP research but also to serve as a vehicle for coordinating research outside the National Federal effort.

I would now like to speak more specifically about several areas of science, emphasizing the state of our knowledge and research for Western ecosystems.

Despite recent claims of acid rain damage, there has been no documented scientific evidence that ecosystems in the Rocky Mountain region have already been damaged by acidic deposition. This lack of evidence, however, does not allow us to conclude that no real or potential problem exists in the Rocky Mountain region. From the EPA perspective, there is simply not enough scientific information available to determine either the existing situation or future trends.

The primary reason for this lack of understanding of the acid deposition phenomenon in the West has been the limited research and monitoring specifically addressing this Region. As mentioned earlier, the Federal research program which is national in scope is only just beginning to expand its efforts to intensively look at the West. Academic and private research efforts have been for the most part limited and highly fragmented. It is only through additional research that we will know the extent to which acid deposition may be a significant Western problem.

Limited research and monitoring has revealed that many potentially sensitive watersheds do exist in the Rocky Mountain region. These watersheds contain high elevation lakes with very little acid neutralizing capacity. While no damage to these systems has been measured, it is the general scientific opinion that these watersheds have only a very limited canacity to assimilate acid deposition inputs.

EPA's Region VIII has performed lake studies over the past three years in the Mt. Zirkel wilderness area (MZWA) in Northwestern Colorado. Figure 1 shows the distribution of lakes in the MZWA according to their acid neutralizing capacity. Seventy-five percent of the lakes sampled in 1983 were found to have alkalinity values less than 200 micro equivalents per litre. Lakes with 200 micro equivalents per litre or more are generally classified as acid insensitive. Lakes are considered potentially most sensitive to acidic deposition when the alkalinity values are 50 micro equivalents per litre or less. As Figure 1 demonstrates, 24 percent of the lakes sampled in the MZWA have fallen within this category. Figure 2 presents the alkalinity values found at the 41 lakes sampled in 1983

by EPA Region VIII and the, U.S. Forest Service (USFS) in the Fitzpatrick wilderness area located in Southwestern Wyoming.
Thirty-seven percent of the lakes sampled were found to have alkalinities less than 50 micro equivalents per liter with seven lakes having alkalinity values below 25 micro equivalents per liter. At these extremely low levels, there is very little buffering capacity within the watershed making them highly susceptible to damage from acidic inputs. (See Figures 1 and 2 attached.)

In addition to the sensitivity of these systems, current information does show that parts of the Rocky Mountain region are receiving acidic deposition from anthropogenic sources. The potential development of Western energy resources and the growth of urban areas could increase significantly the volume of air pollutants in the Rocky Mountain region. However, much remains to be learned about the relationship between air pollution sources, acid deposition and sensitive receptors.

These uncertainties are compounded by the fact that most of the National Acid Deposition Program monitoring stations are located at low elevation sites which may not adequately represent deposition levels at higher elevations. There is a general lack of specific information on existing or projected acid deposition levels in specific areas of the West. Further, in the arid West dry deposition is thought to be the most significant contributor to total deposition. Accurate techniques for the measurment of dry deposition have been difficult and slow to be developed. Only recently have we gained enough confidence in monitoring technology to launch a national dry deposition monitoring network which includes the West.

Several research efforts are currently underway to help address our lack of understanding of the relationship between acid deposition and Western aquatic resources. First I'll discuss the National Surface Water Survey. The Environmental Protection Agency and the U.S. Forest Service will be sampling several hundred lakes in the Western United States this autumn as part of the National Surface Water Survey. The Survey is a key component of a Congressionally-mandated, national program that includes an evaluation of the status and potential sensitivity of aquatic resources relative to acidic deposition. The Survey is a three-phase program focusing on four regions of the country where surface waters are thought to be most susceptible to change from acid deposition: the Upper Midwest, the Northeast, the Southeast and the mountainous West. Phase I entails quantifying the current chemical status of a statistically-based selection of lakes and streams; Phase II will measure seasonal variability and biological resources in a selected subset of lakes and streams; and Phase III will be a long-term monitoring program to quantify future changes in the chemistry and biology of aquatic ecosystems. Each Phase of the Survey contributes to the goal of making regionally-valid assessments of the potential effects of acid deposition on surface waters and associated biological resources.

Last fall, over 1620 lakes were successfully sampled during Phase I of the Eastern Lake Survey. This fall, 888 randomly selected lakes will be sampled in the West. Of these 888, 162 are in Colorado. Sixty-nine of the Colorado lakes lie in 14 of the State's designated wilderness areas.

As was done throughout the East, the non-wilderness lakes will be sampled by helicopter. However, to gain access to wilderness areas in a manner consistent with the Wilderness Act, we and the Forest Service agreed that the best way to sample accessible wilderness area lakes is by pack animals and on foot. Helicopters will be used to sample those wilderness lakes that are inaccessible by ground. Helicopters will also be used to sample 50 of the wilderness lakes being sampled by ground access. This is being done as a check to see if the data acquired via helicopters and the data acquired via ground access are comparable.

In all of these sampling efforts, EPA and cooperating agencies are committed to obtaining the highest quality data possible. We have incorporated a number of quality control measures to ensure that the data from the West are of comparable quality to that obtained last year during the Eastern Lake Survey. Phase I of the Western Lake Survey is an important beginning to a better understanding of the chemical status of Western aquatic resources.

Several Federal agencies have been involved in watershed studies within the region. These studies are basically designed to provide valuable information on the chemical status of lakes to acidic deposition and to detect any trends in atmospheric deposition. Detailed chemical and biological data have been collected at lakes in the following areas:

Wind River Range (Wyoming)
Mt Zirkel Wilderness Area (Colorado)
Flattops Wilderness Area (Colorado)
Rocky Mountain National Park (Colorado)

In 1985, an additional site is planned in the San Juan Mountains of Snuthwestern Colorado. This site was selected based on concern for the potential acidic deposition impacts from the Four Corners power plant and the copper smelters in Southern Arizona and Northern Mexico.

The NAPAP Forest Effects Research Program, a joint program sponsored by the EPA and the Forest Service, is charged with determining what effects, if any, atmospheric deposition may have on U.S. forests.

At this time, forest damage attributed to atmospheric deposition has been documented only for forests of the coastal areas of the Western United States. Ozone, resulting from long-range transport of air pollutants from the Los Angeles Basin, was identified as the initiator of widespread foliar injury, productivity declines and mortality of Ponderosa and Jeffrey pines in the San Bernadino National Forest and other coastal forests.

There has been only one attempt by EPA to identify effects of atmospheric deposition on forests of the Rocky Mountain region. An unsubstantiated account of injury to Engelmann spruce in the area of Gothic, Colorado, was attributed to acidic deposition; however, this account was reviewed and subsequently refuted by an investigation of U.S. and European scientists expert in the field of identifying air pollution deposition effects on forest trees. This investigation team determined that injury was not a result of exposure to atmospheric deposition, but could be attributed to naturally occurring fungal pathogens. However, this group did suggest that the forests of the West be continually surveyed and monitored for atmospheric deposition so that forest damage caused by deposition events will not go undetected.

Much of the data on levels of deposition to Western forests has been gathered by the EPA National Trends Network (NTN) which runs 30 wet deposition monitoring sites in the West, many of which are located in Colorado. The data obtained at the sites in Colorado indicate that wet deposition of acidic substances is high in this region, but is still about half that found in the Eastern U.S. Other sources have determined that ozone and sulfur dioxide concentrations found in remote areas of Colorado have not exceeded concentrations known to cause injury to vegetation. However, the data available for acidic deposition, ozone and sulfur dioxide do not reflect deposition events which are crucial in determining impact to these sensitive forest ecosystems.

The same situation exists for the coastal forests, where, although the types of atmospheric deposition are much different (the concentrations of gaseous air pollutants are higher while the levels of acidic deposition are lower), there is still a lack of information on the levels of atmospheric deposition exposed to these forests.

The Forest Effects Research Program has identified research needs and as a part of its goals, plans to characterize and describe the status of Western forests and determine the levels of pollutants to which they are exposed. This will be accomplished through the establishment of a Western Research Cooperative and its coordination of the National Vegetation Survey.

A special area of concern for EPA and Western Federal land managers is the prevention of significant deterioration of pristine air resources. The Prevention of Significant Deterioration (PSD) provisions of the Clean Air Act (CAA) Amendments of 1977 called for the establishment of a program

designed to ensure that those areas of the country which have ambient air pollution levels lower than those necessary to protect human health did not become significantly degraded by new source development.

The first part of this program identified three air quality classes each with defined allowable levels (increments) of air quality deterioration. Class I areas have the smallest increments and therefore are supposed to have the least amount of new air pollution added to them. Those areas identified as Class I include the following Federal lands which were in existence when the Act was Amended (August 7, 1977):

(1) international parks,

(2) national wilderness areas which exceed 5,000 acres in size,

(3) national memorial parks which exceed 5,000 acres in size, and

(4) national parks which exceed 6,000 acres in size.

The Forest Service manages 88 National Wildernesses which fall under this designation. Seventy-two of them are in the Western United States.

The CAA also calls for a permitting program for new or modified stationary air pollution sources. Before such a new or modified source can commence construction, it must obtain a PSD permit from either EPA or the State air regulatory authority. In order to obtain a PSD permit, a source must demonstrate at least three things in their application.

First, the applicant must demonstrate that it will apply the Best Available Control Technology (BACT) for each pollutant it has the potential to emit in significant amounts. BACT is determined on a case-by-case basis taking into account economics, environmental impacts, and energy requirements. BACT is usually expressed as an emission limitation.

Second, the applicant must provide an air quality analysis which demonstrates that neither the National Ambient Air Quality Standards (NAAQS) nor an allowable PSD increment will be violated. This analysis usually includes both pollutant monitoring and modeling.

Third, the applicant must identify its impacts, if any, on the Air Quality Related Values (AQRVs) of any Class I area. It is through this section of the preconstruction permitting process that the Federal land manager becomes involved in the acid deposition issue.

The Clean Air Act states that "The Federal Land Manager and the Federal official charged with direct responsibility for management of such lands shall have an affirmative responsibility to protect the air quality related values (including visibility) of such lands within a Class I area and to consider . . . whether a proposed major emitting facility will have an adverse impact on such values."

The Federal land manager must determine whether or not a new emission source will cause an adverse acid deposition impact on a Class I area. In the Western U.S., the Forest Service has implemented it's statutory responsibilities by defining "adverse impact" on a wilderness area as any detectable anthroprogenetic change. If such a change can be predicted, the USFS can request that EPA (or the delegated State program) deny the permit or impose additional emission limitations on the proposed source.

It must be noted that the Federal land manager (FLM) and the air regulatory authority (either EPA or the State) have separate, distinct roles in the PSD permitting process. In general, the air regulatory authorities enforce stack emission limitations and ambient air quality standards. The major FLM concern, however, is air pollution effects.

The FLM is directed to protect AQRVs from any air pollutant which includes acid deposition. Hence, the FLM has an affirmative responsibility to protect Class I areas from acid desposition effects from new sources. It must also be noted that for those PSD permit applications where the Class I increments are not exceeded, the FLM only makes a recommendation to the air regulatory authority. The air regulatory authority has the final responsibility to grant, modify or deny the permit. In most cases, the burden of the decision to deny or modify a PSD permit rests with either the EPA or the delegated State air regulatory program.

EPA's regional office in Denver is currently facing a number of difficult decisions relating to potential acid depoition impacts within the PSD permitting process. One example is the recently issued PSD permit for the Chevron Oil Shale project in Northwestern Colorado. At the projected emission rates, the project would have adversely affected nearby wilderness areas as determined by the Federal land manager. After careful review, EPA agreed and required an additional 80 percent reduction in nitrogen oxides (NOx) based on the potential acid deposition impacts of the original emission rates. The annual operating cost of the additional NOx control was projected to range from $30 million to $87 million. There are other examples of new sources of acid precursors in the West including power plants, natural gas treatment plants and high growth urban areas. These emerging new sources and regulatory decisions are complicated by our lack of knowledge on the issue and the high probability of litigation by industry or environmental groups.

Current provisions of the Clean Air Act require EPA, the States and Federal land managers to make decisions on the control of acid deposition from new sources under the PSD program. Yet, permit decisions must be made despite the enormous scientific uncertainty associated with the Western acid deposition issue. Additional research and monitoring efforts will be needed to reduce the scientific uncertainty and to support acid deposition related decisions to be made in the Rocky Mountain region under the PSD program.

Currently, there are no air quality models available within the PSD regulatory process to predict levels of acid deposition in complex terrain. In cooperation with State air regulatory agencies and Federal land management agencies, EPA is studying the feasibility of modifying an existing air quality model to evaluate potential acid deposition loadings from future PSD sources. The modification of this analytical tool is viewed as a high priority item in support of improved PSD decision-making.

The clear identification of the unique scientific problems associated with Western acid deposition has to be considered a high priority. This is the reason why EPA's Region VIII (in concert with several State, Federal and private organizations) has formed the Western Atmospheric Deposition Task Force (WADTF). Twenty private and public organizations participate on the WADTF which is chaired by the EPA Regional Administrator. These include the: States of Colorado, Utah and Wyoming, U.S. Forest Service, National Park Service, U.S. Geological Survey, National Oceanic and Atmospheric Administration, National Acid Deposition Program, Bureau of Land Management, National Acid Precipitation Assessment Program, Council of Energy Resource Tribes, Rocky Mountain Oil and Gas Association,

Environmental Defense Fund, and Academic representation. All members have an active interest in the acid deposition research issue. The major goals of the WADTF are to:

(1) facilitate a dialogue between various agenices interested in the western atmospheric deposition issue;

(2) promote additional research and monitoring which is consistent with the priority needs of the Rocky Mountain region; and

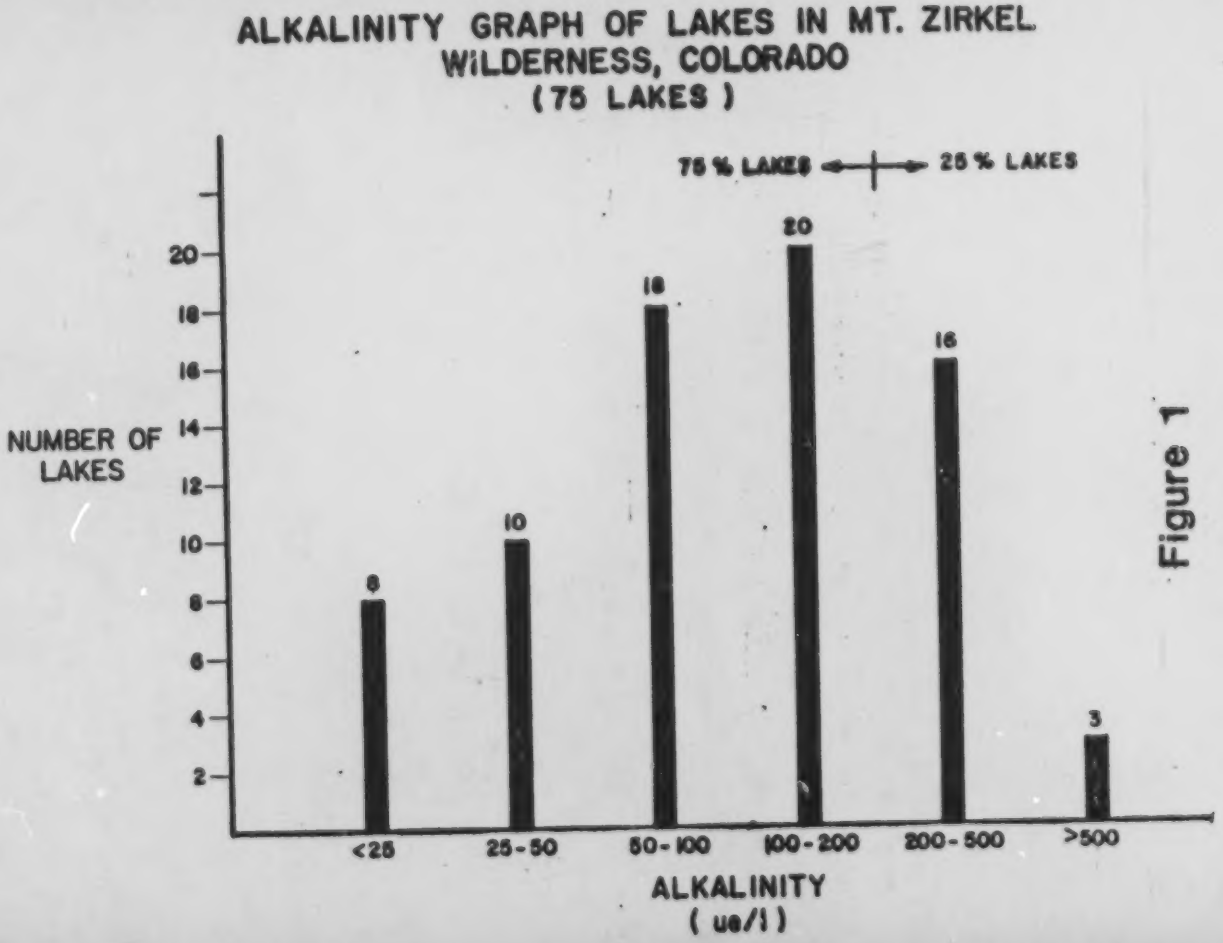
(3) provide an objective evaluation of the Western acid deposition issue.

Current activities of the WADTF include efforts to ensure: the coordination of research activities; the development of comparable data bases; and joint to identification of research needs and priorities. The WADTF is focused on the technical aspects of the problem and does not engage in policy analysis or debate.

The Western Atmospheric Deposition Task Force (WADTF) and the National Acid Precipitation Assessment Program (NAPAP) held a three day research workshop on atmospheric deposition in the Rocky Mountain region. The workshop was held on July 10-12, 1985 in Colorado Springs, Colorado, and served to provide input to the development of a comprehensive and integrated research plan for the Rocky Mountain region. The plan will identify the priority research and monitoring needs in the region and will be used by various organizations to promote additional work in the Western United States.

One final note, moving forward in gaining a better understanding of acid rain science is clearly a high priority. However, the accurate communication of the results of this research to all interested parties and especially to the public at large is equally important. We believe it is critical for the American public to have a clear and undistorted understanding of this complicated problem. We are pleased to have had a opportunity to testify before this Committee to share our understanding and to describe our research activities. EPA Administrator Lee Thomas and EPA staff welcome the opportunity to interact with this Committee on this important and controversial issue.

This concludes our prepared remarks and Mr. Svoboda and I will be glad to respond to any questions.


ALKALINITY GRAPH OF LAKES IN MT. ZIRKEL WILDERNESS, COLORADO
(75 LAKES)
75 % LAKES
25 % LAKES
NUMBER OF LAKES
20
18
16
14
12
10
8
6
4
2
8
10
18
20
16
3
<25
25-50
50-100
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>500
ALKALINITY
(ue/l)

Figure 1

ALKALINITY GRAPH OF LAKES IN FITZPATRICK WILDERNESS, WYOMING
(41 LAKES)

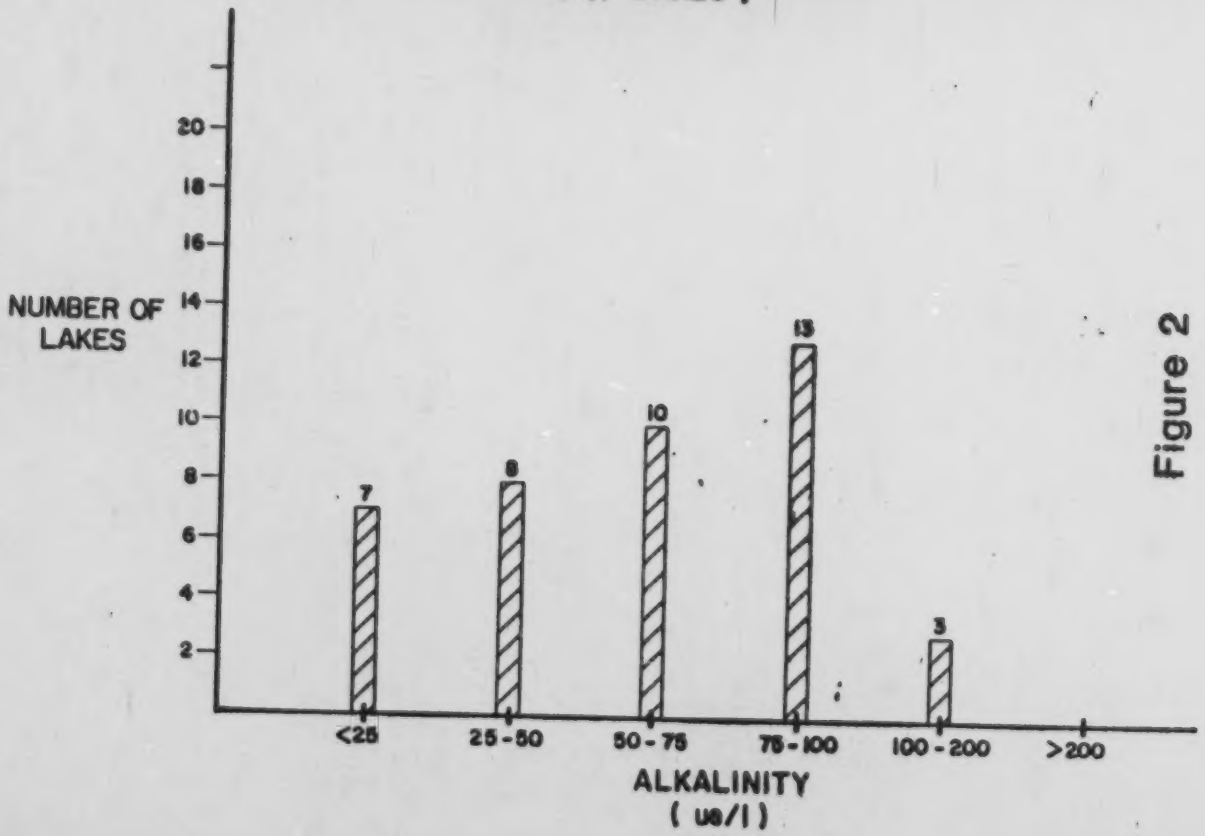

Figure 2

STATEMENT OF
DOUGLAS G. FOX, CHIEF METEOROLOGIST
ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Before the
Committee on Environment and Public Works
United States Senate

Concerning the Effects of Acid Deposition in the West

August 12, 1985

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE:

Thank you for the invitation to appear here today to participate in the Committee's discussion of Western acid deposition.

My name is Douglas Fox. I am presently Chief Meteorologist at the Rocky Mountain Forest and Range Experiment Station, USDA Forest Service in Fort Collins, Colorado. Since September 1984 I have managed a research project related to studing the effects of atmospheric deposition on natural ecosystems in the Western United States.

For your perspective, I will provide a brief statement on my background. I have been in air quality related research all of my career (20 years) starting in graduate school at Princeton University where my Ph.D. dissertation was related to turbulence and the diffusion of pollution in the atmosphere and oceans. Following four years of researching atmospheric turbulence at the National Center for Atmospheric Research in Boulder I joined the government as the Chief of the Model Development Branch of EPA in Research Triangle Park. I have been with the Forest Service since 1974. In addition to numerous publications on various aspects of air quality, I chaired the National Commision on Air Quality Dispersion Modeling Panel in 1980; helped establish the current cooperative agreement between EPA and the American Meteorological Society; and participated in the organization of the First International Conference on Acid Rain Effects on Forests (1976), the National Atmospheric Deposition Program, and the workshop on Western Acid Deposition held last month in Colorado Springs.

I would like to discuss four questions.

1. What do we know, and not know, about the levels of acid deposition presently occurring in the Rocky Mountain West?
2. What do we know, and not know, about the sources of this deposition?
3. What do we know, and not know, about sensitive geological and biological systems in the Rocky Mountain West?
4. Is the knowledge base sufficient to provide protection to these resources under the authority of the Prevention of Significant Deterioration (PSD) section of the Clean Air Act (Title I, Part C of the 1977 Ammendments)?

Finally I would like to review the research project I currently manage including my expectations on both the nature of our results and the time frame

in which they can be delivered. I will conclude with a brief discussion of how this project fits in with the development of a Rocky Mountain Air Quality Research Plan.

First I will state my conclusions and then backtrack so that you can follow my reasoning in arriving where I am.

CONCLUSIONS

1. The Rocky Mountain West is receiving precipitation that contains concentrations of acidifying chemicals below levels experienced in the Eastern United States but above levels experienced in remote ares of the world. The quality of our data are poor because of biases to low altitude sites, no measurements of dry deposition, and unknown quantification of chemical delivery in snow. Thus we really cannot quantify, in either a geographic or a climatologic sense, chemical input to western mountains.

2. Pollution emissions in the Western U.S. result from a small number of large sources and a rapidly growing urban population base. Various estimates suggest overall growth of NO_x emissions (4%) and either growth or reduction of SO_2 emissions (range from 9% increase with Mexican smelter emissions to a 16% reduction with smelter orders and Mexican controls) projected over the next 10 years. Significant local increases of emissions associated with sour gas in Wyoming, oil shale in Colorado and Utah, and power plants around the west are possible. Modeling the impact of changes in the emissions inventory is an activity fraught with uncertainty. Lack of data combined with model controversy and complexity make numerical projections purely speculative.

3. Many alpine lakes and streams in the Rocky Mountains are extremely sensitive to acid deposition. Small additional deposition of pollutant anions could cause significant changes in their water quality and geochemistry. Although the results of increased acidity and cation concentrations on some fish species have been studied, there is little or no data to assess effects on fish habitat and the aquatic ecosystem as a whole. Similarly, effects of air pollution on individual plants are known but no data are available to quantify the sensitivity of terrestrial ecosystems. Research has recently been initiated on alpine ecosystems in in order to identify and quantify relationships between atmospheric deposition and changes in resident biological communities.

4. The lack of knowledge regarding effects of atmospheric deposition on wilderness resources causes controversy in the PSD permitting of potential new sources. In the absence of data to the contrary, Class I Wilderness managers have little choice but to establish tight and conservative limits of acceptable change in the air quality related values of their areas. For example, currently in Forest Service Region 2 this limit is based on a determination of any measurable change unless data exist to show that larger changes will not affect the wilderness. Since changes are modeled results of air pollution or acid deposition from the proposed source, agreement on a model for PSD regulatory purposes is critically needed for expediting permitting of new sources in the west. The model must project concentration, deposition, and effects on air quality related values.

5. The Forest Service, as a component of the National Acid Precipitation Assessment Program (NAPAP) and in cooperation with Region VIII-EPA, initiated a research project this year to study the effects of atmospheric depositon on alpine and subalpine ecosystems in the Mountain West. We are working on three specific problems:
   a. There are no generally accepted measurements (and their associated protocols) to establish the background condition of air quality related values in wildernesses (and other Class I areas).
   b. It is not known how snow removes pollution from the atmosphere; if a snowpack can remove air pollution; and what might happen to any chemicals so removed.
   c. There are no data available to indicate the sensitivity of alpine ecosystems to atmospheric deposition.

In order to solve the first problem we expect to draft a protocol for wilderness measurements this coming year. This will be followed by an effort to build a scientific concensus on the proposed protocol. A final document will be published in about 18 months. The other two problems are much longer term. While results in the form of scientific information will be forthcoming annually, the problems will likely be solved on at least five year time frames.

6. In addition to the Forest Service research mentioned above, it has become clear that a major Rocky Mountain cooperative research and monitoring effort is necessary to address policy, regulatory, and scientific needs in air quality and atmospheric deposition. A clear charge emanating from the July Colorado Springs Workshop was to develop a comprehensive research plan for such an effort. The elements of this plan should include:
   a. Cooperation between federal and state agencies, especially among federal land managers (FS, NPS, BLM, FWS), EPA, and state regulatory and resource management agencies.
   b. Involvement with industry and the environmental community.
   c. Both short and long term components, the former to assess the current situation and the later to inprove our ability to identify and manage sensitive natural resources of the West.
   d. Recognition that the totality of air pollution effects on western resources includes visibility, photochemical oxidant, and atmospheric deposition.
   e. Indication of time frames and funding required to carry out the two components of the needed work.
   f. Policy relevance of the short term work with policy and regulatory needs driving the work on a day to day basis.
   g. Scientific relevance for the long term research with peer review and the expanding knowledge base driving the work on a year to year basis.

CURRENT LEVELS OF DEPOSITION IN THE MOUNTAIN WEST

The only source of multiyear, quality controlled data on deposition levels in the Western U.S. is the National Atmospheric Deposition Program (NADP). These and other data indicate that the concentration of SO_4 in precipitation in Colorado is approximately 1 mg/l with a range as high as 2 and as low as 0.9

mg/l. The concentration in remote rural areas is approximately 0.35 mg/l and in areas of the Northeast it ranges from 2-3 mg/l. In 1982 an average of selected NADP stations throughout the West yielded a concentration of 0.9 mg/l. The concentration of NO_3 in precipitation in Colorado is approximately 0.8 mg/l. In remote rural areas nitrate is 0.08 mg/l while in the Northeast it ranges from 1.2-1.8 mg/l. A west-wide average in 1982 yields 0.8 mg/l (NADP 1985).

These data suggest that the western atmosphere does not contain as much pollution as does the Northeast. However, they also show that Colorado precipitation is not as clean as precipitation not influenced by human activity. Sulfate concentrations in precipitation are roughly 0.3-0.5 times their values the East but are 3 times clean air values. Nitrate concentrations are characterized by considerably more variance than the sulfates (Reddy and Claassen 1985) but are approximately 0.5 times the amount found in the East and 10 times clean air values. It is important to note that these values are concentration of chemicals in precipitation. If I presented wet deposition amounts, the clean air areas would show larger deposition values than the West. I report concentrations because I feel this provides a more realistic picture of air quality effects. There is currently no reliable measurement of dry deposition in the West (i.e., the amount of chemical deposition not involved in precipitation). Since there are also few data on air concentrations, the only indication of concentrations may come from the precipitation data. The lack of data on dry and other (cloud canopy interactions, hoar frost, snow interception, etc.) deposition is a major gap in our knowledge of the western air quality environment.

There is a strong bias in the NADP data toward sites in assessable locations, namely in valleys rather than on mountain tops. It is clear that higher elevations receive more precipitation than do valley locations. If the chemical concentration remains constant then high sites will receive more deposition. However, data reported from locations with an elevational gradient are not sufficient to draw any firm conclusions. A bias also results from the use of unshielded bucket collectors in mountain sites. The collector often does not collect a true sample of snow. The bias of low elevation measurements and buckets are major unknowns in monitoring western deposition.

Attempts to measure chemical deposition to snow have not resulted in definitive values. Since most substances are insoluble in ice, pollutants are likely to reside on the ice surface. Deposited snow in a pack is porous and generally in a state of metamorphosis (alteration of the ice structure). Thus, pollutants can be actively exchanged between the snowpack and the air and can migrate through the pack. Bulk measurements of the snow have indicated both increases and decreases in chemical concentrations over time (Sommerfeld and Fox 1985). At the present time the amount of pollution deposited to the ecosystem through snow can not be quantified.

THE WESTERN EMISSIONS INVENTORY

The two precursors to acid deposition are SO_2 and NO_x. Both are emitted from power plants and other industries such as oil shale conversion; SO_2 is also emitted from smelters and sour gas processing facilities; and NO_x is also emitted from vehicles. While inventories of current emissions are subject

to great uncertainty but projections into the future are even less credible. Current assessments estimate SO_2 emissions in the neighborhood of 2,600,000 tons/year and project them to be roughly 2,800,000 tons/year without smelter controls or 2,200,000 tons/year with controls (Latimer et al. 1985, Roth et al. 1985, Oppenheimer et al. 1985). Mobile source emissions of NO_x are projected to decrease from improved emission control but to increase because of population growth. Numerical estimates range from a reduction of 100,000 tons/year to an increase of 100,000 tons/year. Point sources of NO_x are projected to increase as much as 700,000 tons/year.

A vastly improved and detailed emission inventory is under development for NAPAP. It will provide a data base for sophisticated new models of atmospheric chemistry and transport. The purpose of these models is to provide an improved tool to assess the impacts of control scenarios. Unfortunately, it is unlikely that these new models will be applicable in the Western mountain environment. Meteorology is sufficiently complicated that the transport component model will need considerable modification before it can be accepted for mountain applications. Chemical processes may be considerably altered because of the cold cloud environment in the mountains. Thus, while an improved inventory may exist it is not likely that dramatic improvements will be noted in modeling for the western atmosphere. (Further comments on the need for development of a regulatory model will be addressed in a later section.) However, a big improvement in western model applications could result from an improved meteorological data network of upper air soundings. Data on the three dimensional structure and time variation of the western atmosphere are critically needed for both regulatory and assessment model applications.

SENSITIVE RESOURCES

The concept of sensitivity of resources to acid deposit has evolved based on experiences in Europe and Eastern North America. It has developed around observed damage to aquatic resources and has been associated with observed forest declines. By these considerations the Western U.S. indeed has sensitive resources. However, we also feel it is conceivable that the alpine ecosystems we are studying can be sensitive in completely different ways which are as yet undefined.

Watershed sensitivity is defined on the basis of the alkalinity or the acid neutralizing capacity of surface and soil waters within it. Alkalinity is generated by the basic geology of the bedrock, the nature of the soils on that bedrock, and the vegetation and microbiology within the soil. Many alpine systems in the Rocky Mountains consist of large outcropings of nonreactive rocks, very little soil development, and virtually no vegetative cover (Turk and Adams 1983, Barron et al. 1984, Harte et al 1985, Galbraith 1985). These watersheds exhibit alkalinities near zero indicating that they have little buffering capacity. Increases in deposition of SO_4 and NO_3 to such waters can result in changes in ion concentration. In association with the EPA, USGS, and NPS, sampling of selected sensitive watersheds within wilderness areas has begun. Data confirm that the Rocky Mountain West contains many low alkalinity lakes.

Although these low alkalinity waters are sensitive to chemical change it is not clear what the biological consequences of such changes might be. Data exist

that support dose/response relationships among increased acidity (including associated changes in aluminum and calcium concentrations) and fish mortality and zoo-plankton and phytoplankton populations (Parkhurst and Marcus 1985). However, data do not exist to define the effects of increased deposition on the entire food web of aquatic species and on the critical habitat requirements of important fish species in the west.

Observed forest declines have been associated with a number of air pollution factors including ozone, cloud and fog interception, and acid precipitation. There are no simple answers to this puzzle although declines in the Eastern U.S. have been noted in high elevation red spruce-fraser fir stands. For example, there are currently ten different hypotheses being actively studied to explain the decline (Barnard et al. 1985). Virtually all these hypotheses could apply to other plants in the ecosystem. In wilderness areas the protection mission does not distinguish between nor does it place relative values on trees and other life forms (Fox et al. 1982). Thus we are studying the most simple components of the ecosystem, cryptogams (e.g. lichen and moss), and soil micro organisms. At the same time we are trying to identify the most sensitive processes in the ecosystem, such as the reproduction of species at their limits of survival and the fundamental chemical and biolobical equilibria in soils. This research will help to quantify the sensitivity of organisms and ecosystems in the Western high mountains.

PSD PERMITTING AND ACID DEPOSITION

The Clean Air Act establishes a permit process to protect Class I areas. A new source must show that its pollution contribution will not exceed a relatively small increment. In addition, the Federal Land Manager (FLM) is charged with "an affirmative responsibility to protect the air quality related values ..." of the area through the review of and comment on the permit.

The management of wilderness is also established by law to provide an area as unimpacted by human activity as possible. Thus, in combination, the two laws provide a clear direction to protect the Class I wilderness from any significant change as a result of emissions from new PSD sources. In order to accomplish this, decisions must be made on the basis of information from air quality dispersion models. However, the projection of ambient concentration is only the starting point. It is necessary to estimate deposition and to also estimate the effect of this deposition and ambient concentrations on the air quality related values (AQRV) of the area.

The permitting process is linked to air quality modeling. The model is used to provide information to the various parties regarding the likely outcome of construction. Data are only marginal to that analysis. The modeling and the decisions for which it provides information are long past by the time someone establishes a monitor and verifies the calculation. The model is exercised in a worst case mode rather than a realistic mode. It is therefore unlikely that there will be agreement between model projection and measured concentration. Although these facts introduce controversy and uncertainty into permitting they do not stop the process.

Class I areas are generally far removed from the pollution sources being permitted. Because of the Class I increments the magnitude of pollution projected to reach the area is generally rather small.

In order to determine the effects of pollution on AQRVs, the Forest Service uses a concept of limits of acceptable change to the wilderness. It is desirable to quantify limits of acceptable change to provide a rational basis for permitting. Once the limits are defined, models can be used to determine if new source impacts will exceed aceptable levels.

Unfortunately we do not have a sufficient understanding of the functioning of natural ecosystems to be able to scientifically set limits of acceptable change. Indeed, with regard to the role of the deposition of atmospheric chemicals our knowledge is virtually nonexistant, especially for alpine habitats in the Western U.S. In the absence of any data to the contrary, the Forest Service suggests that any measurable change in any identified AQRV is unacceptable (Haddow 1984). This policy is designed to provide guidance to those preparing permits and to encourage the gathering of data. The source proponent is encouraged to demonstrate the magnitude of an acceptable change. Of course a key issue here is how the impact is modeled.

In order to simplify the process of evaluating permits and ensure equity to all parties, an official permitting model should be developed. This is consistent with EPA policy since they have "approved" models and proceedures (EPA 1984). Unfortunately, western permitting involves distances longer than the usual model application and shorter than so called long range transport model applications. It also requires models able to deal with complex mountainous terrain. Since the permitting involves EPA, federal land managers, and state regulatory agencies, there is a need for agreement on the modeling approach as well as a sharing of the development and evaluation jobs. A high priority is placed on the selection of a modeling system (we and others have them available now) and its evaluation for regulatory applications in western mountain terrain. The system needs to include prediction of concentration and deposition at a minimum.

A WESTERN RESEARCH AND MONITORING PROGRAM

The research project that has been initiated in the USDA Forest Service, Rocky Mountain Forest and Range Experment Station in Fort Collins is part of a rather large program of acid deposition research on terrestial effects. The entire program is explained in the attached material. Also attached are copies of a description of the research work unit and a brief overview of the program of research anticipated.

The research project described can be considered as a component of a larger Western research and monitoring plan. This plan is in the process of being developed under the auspices of the Western Atmospheric Deposition Task Force. As such the plan will address many of the broader issues raised in my comments. That concludes my prepared remarks. I would be happy to answer the Committee's questions.

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ATTACHMENT #1

Atmospheric Deposition Research in the USDA Forest Service

The Forest Service manages a large atmospheric deposition research program as part of the National Acid Precipitation Assessment Program (NAPAP). NAPAP is a multiagency, multidiscipline effort lead by NOAA, EPA, USDA, USDJ, and DOE (figure 1). Forest Service research is conducted in support of three NAPAP task groups--Deposition Monitoring, Aquatic Effects, and Terrestrial Effects. The Forest Service represents USDA as the lead agency for the Terrestrial Effects Task Group.

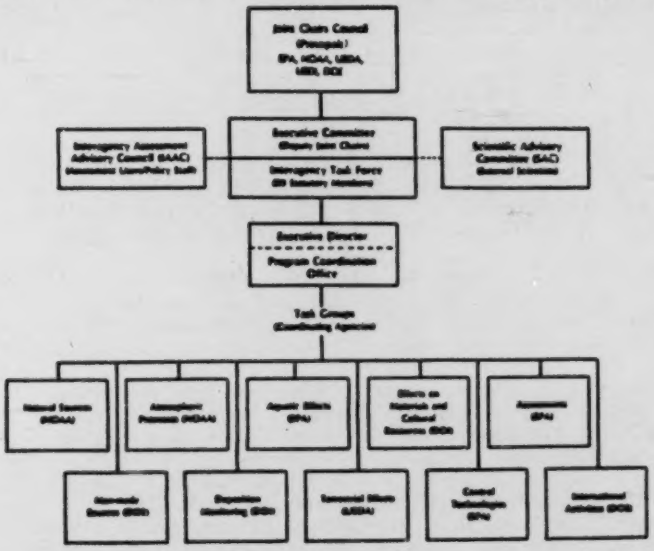

Figure 1.--Organization chart of NAPAP.

Forest Service research units maintain and operate 11 wet deposition monitoring stations throughout the United States. These stations are part of the National Atmospheric Deposition Network (NADP). Research in support of the Aquatic Effects Task Group is conducted by five work units at various experimental watersheds, including the Marcell, Fernow, and Hubbard Brook Experimental Forests and the Coweeta Hydrologic Laboratory. These studies involve long-term monitoring of deposition inputs, estimation of chemical input/output budgets, and examination of processes that influence the chemistry of water delivered to groundwater, streams, and lakes. These same studies also contribute to the Terrestrial Effects Task Group research program on "terrestrial/aquatic linkages." The goal of this program is to

determine how terrestrial ecosystems alter the chemistry of atmospheric deposition and thereby influence the effects on aquatic ecosystems

The remainder of the Forest Service research effort on atmospheric deposition concerns effects on forests. This is a major NAPAP policy question involving a large portion of the Terrestrial Effects Task Group research program. The Forest Service, EPA, and forest industry (through NCASI--the National Council of the Paper Industry for Air and Stream Improvement) have jointly undertaken the management, planning, and funding of an intensive research program on effects of atmospheric deposition on United States forests. This "Forest Response Research Program" began in 1985 with funding by all three partners. The Forest Service and EPA have signed a three-year interagency agreement specifically for the joint management of this program. The management structure is shown in figure 2. This structure ensures that national policy considerations guide the goals and direction of the research, and it ensures that appropriate management and scientific expertise are focused on accomplishing the research goals.

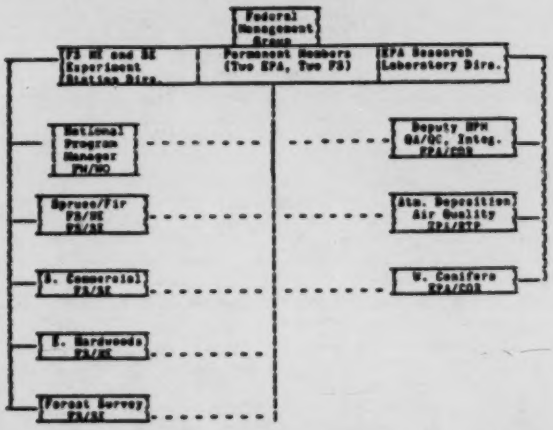
Federal Management Group
FS NE and SE Experiment Station Dirs.
Permanent Members (Two EPA, Two FS)
EPA Research Laboratory Dirs.
National Program Manager FS/WO
Deputy NPM QA/QC, Integ. EPA/COR
Spruce/Fir FS/NE FS/SE
Atm. Deposition Air Quality EPA/RTP
S. Commercial FS/SE
W. Conifers EPA/COR
E. Hardwoods FS/NE
Forest Survey FS/SE

Figure 2.--Management structure for the Forest Response Research Program.

Research in the program will be conducted by a number of "research cooperatives." Each cooperative will be a multiinstitution, multidiscipline team of investigators who will study the effects of atmospheric deposition on a particular forest type. All research studies funded by a cooperative will be selected on a competitive basis.

Research cooperatives have been specified for four forest types--eastern spruce/fir, southern commercial forests (pines), eastern hardwoods, and western conifers. Research plans have been approved for the Spruce/Fir and Southern Commercial Cooperatives.

Program management for the Spruce/Fir Cooperative is assigned to the Northeast Forest Experiment Station (Broomall, PA). This cooperative will study spruce/fir forests in the northeast and southeast, at both high and low elevations. The objectives are to determine why spruce are declining at high elevations and to determine the effects, if any, of air pollutants and atmospheric deposition (if any) on spruce/fir forests. Specific studies will be conducted to define: (1) stand and site characteristics related to hypothesized effect mechanisms; (2)ambient levels of pollutant delivery to trees; (3) the nature of observed symptoms; (4) mechanisms and rates of pollutant assimilation; (5) the response of spruce/fir forests to ambient levels of pollutants and relationships with natural stresses; and (6) models of forest response. A request for proposals was advertised, and approximately 50 research proposals were received. A subset of these proposals will form the initial research program along with studies that had begun earlier in 1985 at the Northeast Station and in the Southern Appalachians (coordinated by the Southern Appalachian Region Resource Management Cooperative--SARRMC).

Program management for the Southern Commercial Forest Cooperative is assigned to the Southeast Forest Experiment Station (Research Triangle Park, NC). This cooperative will study effects on commercial forests (concentrating on pines) throughout the southern and southeastern United States. The objective of the cooperative is to determine if, when, where, and to what extent airborne toxic gases, nutrient elements, toxic metals, acidic substances, and growth-altering organic chemicals are causing or have potential to cause beneficial or detrimental changes in the health, productivity, and stability of commercial forests. This will be accomplished through a research program involving synthesis and integration of knowledge, laboratory studies, intensive field investigations, and modeling of effects on growth and yield. A request for proposals for studies in these areas will be advertised in July, 1985.

Research is palnned to begin in 1986 for the Eastern Hardwoods and Western Conifers Cooperatives. Initial planning will occur in 1985. Management for the Eastern Hardwoods Cooperative is assigned to the Northeast Forest Experiment Station. A management assignment for the Western Conifers Cooperative has not been determined.

In addition to the research cooperatives, a National Vegetation Survey project has been implemented as part of the Forest Response Research Program. The program manager for this survey is located at the Southeast Forest Experiment Station at Research Triangle Park, NC. The objectives of the National Vegetation Survey are to: (1) determine if there is any current or past relationship between measurements of forest condition and atmospheric deposition; (2) determine if there is a long-term trend into the future between forest conditions and atmospheric deposition; and (3) develop a data base that will contribute to efforts to assess the effects of alternative emission control strategies, and that will contribute to other research on the cause/effect relationships between forest condition and atmospheric deposition.

Detailed monitoring of components and concentrations of atmospheric deposition is an important part of the Forest Response Research Program. On-site measurements of deposition are essential if causal relationships

are to be determined. This monitoring support is being managed by the EPA Research Laboratory at Research Triangle Park, NC.

The Forest Service sponsors several other major research projects to study effects of atmospheric deposition on forests. The Northeast Forest Experiment Station at Delaware, OH, is studying the effects of a variety of pollutants and their interactions on the growth of trees. The Rocky Mountain Forest and Range Experiment Station at Fort Collins, CO, began in 1985 a new project to study the effects of atmospheric deposition on high elevation ecosytems in the Rocky Mountains. The impetus for this project is the need for sound information on which to base emissions regulation decisions related to air quality in wilderness areas. The Pacific Southwest Forest and Range Experiment Station at Riverside, CA, is conducting studies of ozone and nitrate effects on forests of the Sierra Nevada. This is an expansion of long-standing research on air pollution effects on forests in the Los Angeles Basin. The Pacific Northwest Forest and Range Experiment Station at Corvallis, OR, is conducting studies to determine the potential for effects on Pacific Northwest forests.

All of the Forest Service research program on atmospheric deposition is a part of NAPAP and is designed to be responsive to NAPAP goals. The overall goal of NAPAP is to develop and progressively improve a comprehensive, scientific information base for decision makers. The Forest Service research program is designed to contribute to understanding the biological and chemical processes that are essential to determining cause/effect relationships between forest condition and atmospheric deposition.

ATTACHMENT #2

ATMOSPHERIC DEPOSITION NATURAL ECOSYSTEMS WESTERN UNITED STATES

MISSION: To improve knowledge about the effects of atmospheric deposition on natural ecosystems in the Western United States.

ATMOSPHERIC DEPOSITION NATURAL ECOSYSTEMS WESTERN UNITED STATES.

- A Major New Research Project

- Headquarters:
  - USDA Forest Service
  - Rocky Mountain Forest and Range Experiment Station
  - Fort Collins, Colorado

- Project Leader:
  - Dr. Doug Fox, Chief Meteorologist

- Current Project Support
  - USDA Forest Service
    - Research (FFASR, FER, TMR, FIDR)
    - National Forest Systems (WAM)
  - USDI Bureau of Land Management
    - Air Resource Management

ATMOSPHERIC DEPOSITION
NATURAL ECOSYSTEMS
WESTERN UNITED STATES

- Support Federal Land Manager Class I Area Air Resource Responsibility
- Identify Sensitive "At Risk" Ecosystem Components
- Quantify Relationships Between Air Pollution Sources and Rural Air Quality
  (Air Quality Dispersion Models)
- Develop Relationships Between Air Quality and Chemical Input to Ecosystems
  (Atmospheric Deposition Models)
- Quantify Responses of Ecosystem Components to Chemical Deposition
  (Dose / Response Functions)
- Identify Processes by Which Atmospheric Chemicals Influence Biological Systems
- Predict Effects of Atmospheric Deposition on Natural Ecosystems

PROBLEM

Protocols for Establishiny Chemical and Physical Baselines

APPROACH

- Wilderness Focus
- Needed for Regulatory Programs
- Establish Scientific Consenses

ACCOMPLISHMENTS

- Documented Protocols:
  - Meteorology
  - Air Quality
  - Visibility
  - Water Chemistry
  - Soil
  - Indicator Species / Ecosystem

Completion: September 1986

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PROBLEM

Processes by Which Chemicals are Input, Transformed and Transferred in Snowpack

APPROACH

- Snow / Ice Physics and Chemistry Studies
- Locate Field Site
- Establish Source / Receptor Relationships
- Measure Deposition and Fate of Atmospheric Chemicals
- Establish Process Hypothesis

ACCOMPLISHMENTS

- Dry Deposition Prediction and Measurements
- Fate of Deposited Chemicals Quantified
- Understanding of Snow Uptake Process

Completion: September 1989

PROBLEM

Effects of Atmospheric Deposition on Productivity of Salmonid Habitat and Sensitive Components of Alpine and Subalpine Terrestrial Ecosystems

APPROACH

- Laboratory Research
  - Dose / Response
  - Biochemical / Physiological Effects
- Field Research - Alpine Ecosystem
  - Acid Parent Material
  - Annual Snowpack
  - Soil Chemical / Plant Interactions
  - Organism Level / Salmonid Food Web

ACCOMPLISHMENTS

- Identification of Sensitive Systems
- Response Information to Deposition
- Predictive Capability

Completion: September 1989

STATEMENT OF

DR. JAMES H. GIBSON
COORDINATOR
NATIONAL ATMOSPHERIC DEPOSITION PROGRAM
NATURAL RESOURCE ECOLOGY LABORATORY
COLORADO STATE UNIVERSITY
FORT COLLINS, CO 80523

BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
DENVER, COLORADO

12 August 1985

Mr. Chairman:

I am pleased to have the opportunity to explore the issue of atmospheric or acid deposition in the Rocky Mountain West and the potential for future adverse environmental effects. Even though the institution with which I am affiliated is in the relatively "unpolluted" West, I have been active in atmospheric deposition programs since 1978 when I and others associated with the State Agricultural Experiment Stations and several federal agencies initiated the National Atmospheric Deposition Program (NADP) monitoring and research studies. As coordinator for NADP I have been primarily responsible for organizing and managing the atmospheric deposition monitoring network, and in 1982-83 I assumed responsibility for coordinating the National Trends Network (NTN) of NAPAP, currently a 150 station subset of an approximate 200 station NADP/NTN monitoring network.

Current Status of Research and Monitoring in the Rocky Mountain West

Our ability to define the extent of current or future environmental problems caused by atmospheric deposition is dependent on the extent and quality of research and monitoring programs. In the Rocky Mountain West, with the exception of deposition monitoring, there has been little organized research to address potential problems related to atmospheric deposition. The U.S. Geological Survey, with support from EPA Region 8 and the U.S. Forest Service, is conducting studies of headwater lakes and streams in several locations in Colorado and Wyoming. The National Park Service has established a long-term lake and stream study in Rocky National Park. A smaller study on a Colorado watershed is being conducted by the Lawrence-Berkeley Laboratories, and a lake survey in the State has been conducted by the University of Colorado. In addition, EPA has supported the monitoring of the chemistry of a small number of lakes in Montana by Montana State University. All of these studies to date have focused on lake and stream chemistry with the major focus the potential acidification of lakes in geologically sensitive areas. Monitoring of atmospheric deposition as part of the NADP/NTN network has intensified in the last several years with a total of 55 of approximately 200 monitoring stations being located in the Rocky Mountain states and west.

Until recently, there has been no organized research effort to address potential effects of atmospheric deposition on terrestrial systems including forests. The U.S. Forest Service Rocky Mountain Range and Experiment Station at Fort Collins, Colorado, initiated such an effort this year. Their intention is to establish long-term research and monitoring studies on forested watersheds in the Rocky Mountain region. The primary objectives of this study will be to assess the current status of the health of alpine and subalpine systems, and to establish long-term research to better define the basic factors controlling these systems. This knowledge is needed to assess the potential for atmospheric deposition to interrupt the natural processes, which could result in adverse effects on forest health and productivity. This program is currently in the initial implementation phase, but does represent an important step forward in recognizing the need for research and monitoring in areas of the Rocky Mountain West even though we have not yet experienced serious adverse effects of air pollution or atmospheric deposition in aquatic or terrestrial ecosystems. We have however seen a significant reduction in visibility which is a direct consequence of increased sulfur dioxide emissions and sulfate aerosol formation.

A Case for Long-Term Research and Monitoring in the Rocky Mountain West

As stated, this region of the western United States has not experienced serious adverse effects from atmospheric deposition on terrestrial or aquatic ecosystems. While there have been a few reports suggesting adverse effects of acidic deposition primarily related to acidification of surface waters, and one report of damage to forests in the high elevation mountains, a careful investigation of the data in these reports casts considerable doubt on the interpretation. They suffer from many of the problems which have been experienced in early eastern studies. That is, data from one or two points in time have been inappropriately extrapolated to suggest long-term changes or data taken from a single location over a relatively short time period has been interpreted only in terms of atmospheric deposition, ignoring natural variability. Longer term and more intensive studies of the U.S. Geological Survey and National Park Service, already mentioned, have demonstrated that natural variability can account for these suggested adverse impacts and that, in fact, no adverse effects can be established when data from longer term and more intensive studies are analyzed. In the case of a report on adverse effects on forests, it is apparent that this was a pollution effects around such large metropolitan areas as Denver and Salt Lake City, nor areas around specific sulfur dioxide sources such as copper smelters.)

The contention that no regional adverse effects are occurring in Rocky Mountain surface waters or forests is in keeping with the levels of sulfur and nitrogen deposition in this region. It can be seen in the following table that both sulfate and nitrate concentration and deposition levels are lower by a factor of three or four than those occurring in regions of the United States where lake and stream acidification has been identified and forest effects are suspected. (It is noted that in

the case of forest effects, we are probably dealing with a complex air pollution problem which involves ozone and other oxidants related to anthropogenic emissions. In the case of the data presented in the table, consideration is given only to the wet deposition of sulfur and nitrogen compounds.)

1983 NADP/NTN PRECIPITATION DATA

	MEAN CONCENTRATION		
	SO_4 μeq/l	NO_3 μeg/l	pH
Olympic National Park, WA	5	1	5.4
Caldwell, OH	63	26	4.2
Rocky Mountain Region*	17	10	5.1

	DEPOSITION		
	PPT (cm)	SO_4 kg/hectare	NO_3 kg/hectare
Olympic National Park, WA	405	15	4
Caldwell, OH	103	31	17
Rocky Mountain Region*	47	4	3

*Mean of eleven sites in NM, CO, WY, and MT.

While these levels of sulfur and nitrogen concentration in deposition are significantly lower than those in the eastern United States, it is noted that their concentrations are also considerably higher than those at a relatively clean or background sites such as Olympic National Park on the west coast in the state of Washington. Before we in the Rockies become comfortable with this picture, it should also be noted that research, while not identifying adverse effects currently, has demonstrated that this region is one in which many of the high mountain lakes and streams are some of the most sensitive to acidification in the world. On the sensitivity scale used to define lake sensitivity, many of these lakes rate below 50, with 200 set as a threshold for sensitive systems. In addition, in some limited long-term studies of so-called "Benchmark some declines in alkalinity which may well be the result of the atmospheric deposition. Thus, we cannot be complacent and assume that the situation will not change in the future if emission levels increase.

Specific Research Needs

In order to define the need for atmospheric deposition research and monitoring in the Rocky Mountain region, it is important to list certain characteristics of this region which set it apart from the eastern United States.

1. As already stated, this region is not experiencing significant adverse effects due to atmospheric deposition. Deposition levels as currently monitored are below those in areas of the east in which effects have been demonstrated.

2. The areas of concern in the Rocky Mountain region are primarily the high mountain locations which contain some of the world's most sensitive headwater lakes and streams, and which receive 60-70 percent of their precipitation from snow. These are the same areas in which the alpine ecosystems and subalpine forests are found.

3. Much of the population increase in the country is taking place in the western states, along with increased development of natural resources such as gas, coal, and oil. Even though we have seen a decline in some resource development as with the metals industry, as future needs for fossil fuels become critical, there will be enhanced energy development and consumption in the region. Deposition levels of sulfur and nitrogen compounds as well as other air pollutants can be expected to rise if attention is not given to their control.

4. The Rocky Mountain region contains much of the wilderness system in the lower 48 states. These designated Class I systems are to be protected from <u>significant deterioration</u> of their aquatic and terrestrial ecosystems.

Based on these factors, it is clear that the situation in this region differs significantly from that in the eastern United States. In the Rocky Mountains, we have the opportunity to <u>prevent</u> a serious deterioration of the environment if we are vigilant in identifying sources and establishing controls as well as designing long-term research and monitoring studies. Research in the west needs to be designed <u>not to detect the extent and severity of the problem</u>, but to identify those subtle changes which are indicators of the beginning of significant adverse effects, whether they be terrestrial or aquatic. In addition, research needs to take into consideration specific aspects of our ecosystems which differ from those in the east, such as the high elevation alpine and subalpine systems, and the fact that significant portions of moisture are contributed by snow melt to these systems. Our research needs to address the regulatory needs of agencies responsible for enforcing PSD requirements for the wilderness and other Class I areas. We need to address the potential impact of increased population and development of energy resources on future emission levels.

It is instructive to look more specifically at several directions research and monitoring should take in the western United States. These are not presented as a definitive list, but are to illustrate some of the high priority areas.

1. It is important to initiate long-term studies to establish natural ecosystem variability. One of the major limitations in establishing

a cause and effect relationship in areas of the world where adverse effects on aquatic and terrestrial systems are expected is an almost total lack of knowledge of natural variability. For example, it is known that the acidity of lakes varies naturally over both long and short periods of time due to natural causes. Little is understood about the magnitude. The same is true for variability in forest growth which can be affected by many natural factors. In the western regions of the country where atmospheric deposition has not reached levels which are causing adverse effects, it may still be possible to assess natural variability. This, however, will require a long-term commitment to carefully designed research and monitoring studies. This is another way of stating the need to establish base line conditions in both aquatic and terrestrial systems.

2. Research needs to be conducted which will establish the most sensitive biological controls in natural systems which are expected to be initially affected by atmospheric deposition. It is likely that the onset of adverse effects will be subtle and it will be necessary to establish long-term research and monitoring studies to identify and detect those processes which are important in controlling the health and productivity of both aquatic and terrestrial biota.

3. Because of the wilderness areas with Class I protection, it is important to establish research programs which will serve to establish the necessary regulatory requirements to protect these areas from adverse impacts. This requires linking emissions and concentrations with ecosystem impact. The term "adverse" needs to be carefully defined in terms of effects on forests and aquatic biota, and this needs to be translated into a regulatory language which will permit emissions to be maintained below critical levels.

4. The most sensitive areas are those of the alpine and subalpine systems which include the most sensitive lakes and streams. Sixty to seventy percent of the precipitation in these high elevation areas is snowfall. In addition, these systems receive much of their moisture from the melting of the resulting snow pack. It has been demonstrated in other areas, particularly Norway, that the early melt of snow pack is particularly concentrated in chemical species which are incorporated into the snow. Research is needed to address both the chemical composition of snow pack as well as the effect of melt water on both the headwater lakes and alpine and subalpine vegetation.

5. Additional atmospheric deposition monitoring needs to be conducted at high elevation sites. Research in the eastern mountains at locations such as Camel's Hump and Mt. Mitchell has demonstrated the critical need for a better understanding of deposition at mountain top levels. Currently, the NADP/NTN network monitoring stations are primarily at lower elevations where accessibility during the winter months is possible but which may result in large underestimations of deposition at the higher elevations which receive several times more precipitation.

6. Most of the research studies in eastern North America and Canada and Europe are concerned with problems in areas already heavily impacted by atmospheric deposition. The understanding of physical and biological processes under natural deposition levels is not possible in studies conducted in these areas. Research at western sites coupled with studies in the east could well serve as a basis for understanding of critical natural processes. Manipulative studies could be conducted by adding sulfur and nitrogen compounds to systems which did not already experience heavy atmospheric loading in order to understand response to low level additions.

In summary, the above represent only a few areas where research should be directed to the unique problems of this region. While research in the eastern United States is aimed at developing and understanding of the extent and severity of the problem as well as a cause and effect relationship, research in the west should be directed toward preventing these conditions from occurring in the future. This suggests research related to detecting the early signs of adverse impacts and long-term research and monitoring studies to document the background or natural variability. In addition, research should support the regulatory needs of those agencies concerned with protecting the Class I wilderness areas from adverse impacts. As stated, a limited amount of effort is directed toward studies of surface water chemistry, but little effort has been directed toward forests and alpine communities. Of critical importance, is a coordinated effort with a long-term commitment. Unfortunately, in the eastern United States only one long-term Forest Service research area collected data which has been highly significant to the atmospheric deposition research efforts; that is Hubbard Brook, and that data set is limited in its scope. We have the opportunity to establish long-term research and monitoring programs in the western regions of the country which should enable us to establish background conditions as well as detect the early warning signs of adverse effects in aquatic and terrestrial systems.

Note: Presented in part to Subcommittee on General Oversight, Northwest Power and Forest Management of the Committee on Interior and Insular Affairs, U. S. House of Representatives, 16 July 1985.

STATEMENT OF DR. JOHN T. TURK
RESEARCH HYDROLOGIST
U.S. GEOLOGICAL SURVEY
BEFORE THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
U.S. SENATE DENVER,
COLORADO AUGUST 12, 1985

Mr. Chairman, I appreciate the opportunity to testify before this committee on acid-rain research in the western United States. I am John T. Turk, research hydrologist for the U.S. Geological Survey at Lakewood, Colorado. I am currently doing research on acid rain and other water-quality subjects in the Rocky Mountain area. I would like to begin my testimony by stating that the assessme t that I will present is based on my evaluation of the scientific proof presented to support or reject individual hypotheses regarding the present effects of acidification in the West. It is important to note that scientific proof requires more than the finding of one set of data that supports a hypothesis. Scientific proof is a continuing process that attempts to utilize as many types of data and approaches as possible to eventually eliminate all but one plausible hypothesis.

Much of the published literature regarding acidification in the West is summarized in two reports: "An Evaluation of Trends in the Acidity of Precipitation and the Related Acidification of Surface Water in North America," which I authored, and "The American West's Acid Rain Test," by Roth and others. Additional information reported here is the result of cooperative studies of the U.S. Geological Survey and other Federal, State, and local agencies. I will be pleased to provide the committee with a copy of the report that I authored.

There is substantial scientific proof that the West contains many lakes and streams that are very sensitive to acidification. A combination of poorly reactive bedrock, large accumulation of the annual water budget in the snowpack, and minimal opportunity for reaction of snowmelt with soil and bedrock cause many of the alpine and subalpine watersheds of the West to be extremely sensitive to acidification. Studies in the Sierra Nevada, Cascades, Flat Tops Wilderness Area of Colorado, and Rocky Mountain National Park, as well as recent studies in the Wind River Range of Wyoming and the Mt. Zirkel and Weminuche Wilderness Areas of Colorado, indicate lake alkalinities sufficiently low to allow harmful degrees of acidification if these systems should receive precipitation as acidic as that in the Northeastern United States.

Because of the sensitivity of many Western aquatic systems, there is a need to carefully monitor those systems to detect future trends in acidification if they appear, and to examine historical data for information that can help quantify any existing effects. At present there are several efforts in progress attempting to do this. The recent formation of the Western Atmospheric Deposition Task Force[1] and the convening of the Rocky Mountain Atmospheric Deposition Research Workshop[2] this July were first steps in coordinating these individual efforts to produce regionally comparable studies.

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[1]The task force is comprised of representatives from Federal, State, Industry, Environmental, and Native American groups with an interest in atmospheric deposition. The task force is chaired by the USEPA Region VIII Administrator.

[2]July 10-12, 1985, Colorado Springs, Colo. Sponsored by the National Acid Precipitation Assessment Program and the Western Atmospheric Deposition Task Force.

For an increase to occur in the acidity of a sensitive aquatic system, such as those just mentioned, acid must be introduced into the system. In the West there is ample documentation of acidification as a result of mining, which produces changes in chemical-weathering reactions resulting in the formation of acidic mine drainage. Acidic precipitation falling on sensitive watersheds has been observed in areas downwind from specific, local sources of acid-forming sulfur dioxide and nitrogen oxides. In the West, these local sources generally are major metropolitan areas--for example, Denver, Puget Sound, and several California metropolitan areas. The evidence that these emissions have produced acid precipitation includes (a) time trends in precipitation acidity that are similar to trends in concentrations of pollutants such as nitrogen oxides, and (b) precipitation acidity values slightly more acid than would be expected in areas remote from local sources of pollutants. The historical data do not establish the date when acidification may have begun, nor allow any unambiguous evaluation of the degree of acidification that has occurred. To attempt to quantify this acidification by examining the geographic distribution of precipitation acidity is not possible because large particles, which tend to be alkaline, are preferentially removed in mountainous terrain.

The evidence for acidification of aquatic systems by acidic precipitation includes (1) time trends of alkalinity in lakes, reservoirs, or streams that are correlated with time trends in acidity of precipitation (for example, Como Creek near Denver, Colorado), or (2) decreases in surface-water alkalinity that are of the same magnitude as the assumed change in the acidity of precipitation (for example, two reservoirs east of San Francisco and several western streams in the U.S. Geological Survey's Hydrologic Bench-Mark Network). The Denver and San Francisco area examples are consistent with the hypothesis

that local major metropolitan areas are the sources of acidification. The Hydrologic Bench-Mark data are currently being investigated for possible regional causes. A comparison of pH and alkalinity of selected Colorado lakes for 1938-42 and 1949-52 with similar data for 1979 indicated decreases in pH and alkalinity of the lakes; however, the changes in pH are less than the average 24-hour natural variation in pH of other Colorado lakes of comparable chemical composition, and the alkalinity decreases seem better explained by dilution caused by climatic variation than by acidification.

Temporary decreases in alkalinity of a lake in California and one in Colorado may be caused by simple dilution of lake water with snowmelt rather than by acidification. In a lake fed by alkaline ground water, the temporary addition of less-alkaline snowmelt will result in a decrease in alkalinity of the lake water whether the snowmelt is acid or not. In contrast to this dilution process, acidification is caused by the introduction of hydrogen ions (acidity), which react with bicarbonate to produce an acid water. Data presented by Roth and others are insufficient to make the distinction between these equally plausible explanations of decreases in alkalinity.

To summarize, on the basis of published studies, minor acidification of some aquatic systems has occurred in the West, downwind from a few major metropolitan areas. No indication of regional acidification has been presented other than preliminary interpretation of trends at U.S. Geological Survey Hydrologic Bench-Mark Network stations. Recent work by the U.S. Geological Survey, U.S. Environmental Protection Agency, U.S. Forest Service, Colorado Department of Health, and Ft. Lewis State College in the Mt. Zirkel, Flat Tops, and Weminuche Wilderness Areas of western Colorado has shown similar sulfate concentrations in lakes of the three areas whose chemical compositions are controlled by precipitation chemistry rather than by bedrock composition.

Similar sulfate concentrations in all three areas, even though the areas differ greatly in proximity to existing sulfur dioxide sources that are postulated to be regionally important (such as smelters and major coal-fired powerplants), indicate that regional effects are not detectable at the present time. Thus, regional-scale acidification by sulfate acidity appears not to have occurred, although there is not sufficient information to determine whether regional-scale acidification by nitrate acidity has occurred.

This concludes my statement. I will be pleased to provide the committee with a list of references on which I based my statement or to respond to any questions you may have.

REFERENCES IN SUPPORT OF
STATEMENT OF JOHN T. TURK
RESEARCH HYDROLOGIST
U.S. GEOLOGICAL SURVEY
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STATEMENT

OF THE

WESTERN REGIONAL COUNCIL

SUBMITTED TO THE

SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

FIELD HEARING

ON

ACID RAIN

DENVER, COLORADO

AUGUST 12, 1985

STATEMENT OF THE WESTERN REGIONAL COUNCIL

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DENVER, COLORADO
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Mr. Chairman and Members of the Committee:

I am Bruce Rockwell, Chairman of the Board of Colorado National Bank. I am submitting this statement on behalf of the Western Regional Council.

The Western Regional Council (WRC) is an organization of the chief executive and chief operating officers of 43 companies engaged in a broad variety of business activities in the Western United States. The WRC represents financial, mining, utility, investment, construction, transportation, accounting, engineering, oil and gas, and other business enterprises. One of the primary purposes of the Council is to establish a balanced viewpoint between the need for a safe and clean environment in which to live and the need for a healthy and active economy in our region.

The WRC has been actively interested and involved in air quality issues since it was organized in 1977. We have worked with the Congress, the Administration, Western Governors, and others on those clean air and air quality issues that uniquely impact the West.

Air quality in the West is of particular interest to the WRC. WRC members not only work in the West, but also live in the West. As westerners, we feel we have a unique perspective and interest in clean air and acid rain issues in our region.

Consequently, we appreciate this opportunity to provide our perspective to your Subcommittee. In this statement, we will review recent research, findings and evidence regarding emissions, air quality and acid deposition in the West. We will also outline the WRC position on acid rain. Finally, because of the interrelationship of air quality programs and issues, we will briefly review some of our other clean air recommendations and concerns.

ACID RAIN IN THE WEST

Although there remain many fundamental questions about the causes and effects of acid rain, Congress is being pressured to enact acid rain control legislation. In the absence of adequate scientific data, some proposals to control acid rain have tended

to become regionally and economically divisive. Such proposals go beyond the primary environmental goal of reducing acid rain and its effects and could have unnecessarily negative economic and social consequences in the West and throughout the nation. It is therefore imperative for us in the West to be active in the acid rain debate.

One of the Western Regional Council's greatest concerns about the acid rain debate, particularly regarding acid rain in the West, is that the debate focus on actual research, facts and scientific evidence, and not be driven by unsubstantiated allegations or threats, the private agenda of individuals or groups, or inaccurate summary statements or "desired" conclusions from various unsubstantiated reports. Consequently, the WRC hereby submits the following facts for your consideration.

Much of the attention of Congress and of current research efforts regarding acid rain focuses on sulfur emissions. The fact is that present-day anthropogenic sulfur emissions in the eleven western states are actually lower than they were 35 years ago. Considering the remarkable growth that has occurred in the western states since 1950, that is a major achievement.

But that is not the only good news. Under the present clean air laws, sulfur emissions between now and the year 2000 are projected to decrease even further in the West. This means that, under current law, sulfur emissions in the year 2000 will be lower than those that occurred a half century earlier in 1950.

These projections come from several sources and, interestingly, are contained in figures published in the recent World Resources Institute (WRI) report on acidic deposition in the West. Unfortunately, neither the text nor the summary of the WRI document reports this information. In fact, while the summary concludes that SO_2 emissions may remain approximately constant in the West through 1990, projections illustrated in the figures in the main report clearly show a projected decrease of more than 600,000 annual tons.

Unfortunately, projections of future sulfur emissions in the West cited by proponents of acid rain legislation seem to inflate realistic projections for new source construction (e.g. oil shale and tar sands development, power plant construction, etc.) and fail to take into account recent actions that will further reduce emissions (e.g.shutdown of smelters in Utah and Arizona, cancellation of a power plant in Utah, etc.). A more recent event that will further reduce projected sulfur emissions in the Southwest is the agreement between the U.S. and

Mexico regarding the Cananea and Nacozari smelters in Mexico. The agreement provides that an acid plant will be in operation at Nacozari (previously expected to emit nearly 500,000 tons per year) by 1988, and that any expansion at Cananea would be accompanied by construction of an acid plant on that smelter.

Decreased sulfur emissions and improved sulfur dioxide ambient air quality levels in the West are confirmed by the EPA National Air Quality and Emissions Trends Report released on May 9, 1985.

The EPA report generally concludes that the nation's air is improving every day and that, as EPA Administrator Lee Thomas summarized, "it is far cleaner today than it was eight years ago...." Specifically, the report concludes that nationwide sulfur dioxide ambient air quality levels improved 36 percent, sulfur oxide emissions improved 19 percent and ambient particulate levels improved 2(percent. Data and charts within the report, itself, depict specific improvement in the West.

Other region-specific data also confirm emission reductions in the West. A report commissioned by the Environmental Improvement Division of the State of New Mexico concluded that statewide New Mexico emissions of the "two pollutants most subject to control policies at the state level, SO_x and TSP,

have declined dramatically during the late 1970's; SO_x emissions will soon be back down to the level of the 1940's, and TSP emissions will soon be only a fraction of the early 1940's level."

Why are emissions in the West lower today than they were in 1950?

First, between 1970 and 1980, overall SO_2 emissions in the West were decreased by more than 1,300,000 annual tons. Most of that SO_2 reduction was due to the installation of constant emission controls required by the Clean Air Act on copper smelters which are located in the West, primarily in the Southwest. This reduction did not come cheaply. During the past fifteen years, the non-ferrous metals industry has spent nearly $2.0 billion on air pollution controls, a higher percentage of capital expenditures for pollution than for any other major industry.

Second, coal-burning power plants in eleven western states account for less than 3% of U.S. power plant SO_2 emissions, primarily as a result of constant emission controls required by the Clean Air Act and the burning of low-sulfur western coal. A group of twenty of the utilities located in the West and Southwest have spent or are committed to spend $3.5 billion by 1990 for capital expenditures for air pollution controls on just their power plants alone.

Most existing western coal-fired stationary sources use low sulfur fuels. In addition, they are already subject to the nation's most stringent emission limitations. For example, the State of Utah requires new utility sources to use low sulfur fuels and to reduce sulfur emissions by 90 percent. New source SO_2 emission limitations for coal fired power plants (in pounds per million Btu) are 0.20 in Wyoming, 0.34 in New Mexico and 0.40 in Colorado. By comparison, federal EPA regulations applied in Eastern states vary from 0.60 to 1.20, depending upon the sulfur content of coal. For old sources, EPA emission limitations of SO_2 are 0.30 lbs per million Btu in Wyoming, 0.65 in New Mexico, and 1.00 in Arizona, but range up to 11.70 in the Eastern states.

In the entire 17 western states, 31 percent of the coal fired electrical generation is from plants with installed emission control technology, compared to only 7 percent in the Eastern 31 states. The 17 western states emit only 7 percent of the nation's utility SO_2, 1.2 million tons, while generating 19 percent of U.S. coal fired electricity, compared to the 31 Eastern states which emit 93 percent of the nation's utility SO_2 while generating more than 80 percent of coal fueled power generation. If the entire nation were proportionately meeting these emission levels, the total SO_2 emissions from coal fired utilities would be about 6 million tons instead of

more than 17 million tons (a 65 percent reduction -- significantly more than proposed in U.S./Canada discussions or in federal legislation).

A specific example of western power plant emission reductions is found in the Four Corners region (Arizona, New Mexico, Colorado and Utah). New controls at the Four Corners Power Plant are reducing total sulfur emissions by more than half.

Unfortunately, the debate over such issues as sulfur emissions and concentrations, acidic deposition, and damage or potential for damage is often driven by inaccurate summary statements or "desired" conclusions rather than by actual scientific evidence or documentation. An example of this problem involves the observations made last year by two scientists and the unsupported, inaccurate conclusions of subsequent media and other reports that acid deposition damage has occurred to forests in the vicinity of Gothic, Colorado.

Earlier this year the EPA supported an investigation by a group of scientists on the health of forests in the vicinity of Gothic, Colorado. The EPA team of scientists, led by Dr. Robert Bruck of North Carolina State University, was unanimous in its conclusion that, although trees showed natural symptons of decline, there was no evidence that atmospheric deposition

of any kind was contributing to or exacerbating this natural process. In fact, some tree increment cores showed a marked increase in growth over the past twenty years. The EPA team of scientists concluded that both sulfate and nitrate deposition in Colorado were well below values believed to cause either aquatic or terrestrial damage and were well below values found in the eastern U.S.

Other inaccurate allegations of acid rain damage in the West are often based on invalid comparisons to the East. Notably, in 1980, SO_2 emissions from the State of Ohio by itself were approximately the same as the total SO_2 emissions from all of the eleven western states, an area almost 29 times larger than Ohio. Thus, it is not surprising that precipitation acidity in the rural northeastern U.S. has typically been about nine times more acidic than in the rural West based on results from the precipitation monitoring system of the National Atmospheric Deposition Program. Similarly, sulfur deposition is typically several times greater in the Northeast, and nitrate deposition is also considerably greater in the Northeast than the West.

In considering the potential for acid deposition damage in the West, it is also important to realize that although SO_2 emissions in the West were significantly greater for most of

the years between 1960 and 1980 compared to the present, there were no scientifically documented cases of damage due to acidic precipitation in the West during or following that period.

Therefore, despite statements common in news releases, articles and some reports concluding that there is acid deposition damage in the West, there is, in fact, no valid scientific evidence documenting acidic deposition damage anywhere in the West.

Since no known acid precipitation damage occurred in the West when SO_2 emissions were much higher, and present SO_2 emissions are lower and are projected to decrease even further over the next 15 years, it is difficult to understand the specter of future acid rain problems in the West that has been raised by some groups and individuals.

This is especially true since, as pointed out in the World Resources Institute report, potentially sensitive ecosystems are not typically located near areas of highest sulfur and nitrogen deposition in the West, and objective research has not established significant long-range transportation of sulfur emission products in the West nor damage or serious threat from transport.

For example, a 1984 study by Ashbaugh, et al., utilized sulfur data from forty stations in eight states of the Western Fine Particle Network. Their spatial pattern analysis showed that Arizona and New Mexico sulfur deposition was negatively correlated with sulfur deposition in northern Colorado, northern Utah and Wyoming, indicating that sulfur emission products in the southern Rocky Mountains are not transported in significant amounts to the northern Rockies.

As a further example, a recent U.S. Geological Survey study analyzed stream chemistry between 1965 and 1981 at benchmark stations throughout the United States, a period when SO_2 emissions in the West, particularly Arizona, decreased significantly. Although stream acidity did slightly decrease in Arizona during that period, it actually increased slightly in Colorado, indicating that Arizona SO_2 emissions apparently do not measurably affect Colorado stream chemistry.

Finally, even short-range transport may not be a problem in the West. Between 1970 and 1980, Arizona SO_2 emissions were reduced by approximately 1,400,000 tons (much more than in any other state in the Nation). And yet, despite the higher SO_2 emissions of past years, the Arizona Clean Lakes Classification Study in 1983 showed that none of the sampled 84 Arizona lakes were below the critical alkalinity sensitivity level of 200 microequivalents per liter.

To date, acid rain research in the Western States has been more modest than that in the East, but it has not identified any serious acid precipitation problems such as may exist in the Northeast. Although some isolated surface waters in the West have been identified as "potentially sensitive", no confirmed adverse effects attributable to rainfall acidity have been established.

Finally, while we in the WRC are concerned about the national implications of potential environmental damage in any region of the U.S., we approach this issue with some assurance that the environmental problem of acid rain is not a western one. A number of factors contribute to the difference between the Eastern and Western regional situation and to the likelihood that acid rain is not a serious threat in the West:

1. Perhaps most importantly, recent research, as reviewed above, is indicating that even with the higher levels of emissions of past years, no significant acid rain damage has occurred in the West.

2. As previously documented, sulfur emissions in the West are much lower than in the East, have declined significantly in recent years, and are expected to continue to decrease.

3. There are fewer major emission sources in the West, and they are more widely distributed geographically than in the East.

4. Most existing Western coal-fired stationary sources are already subject to the nation's most stringent emission limitations. (Only about three percent of the sulfur dioxide emissions produced by coal-fired utilities in the United States is generated in the 11 Western States.)

5. Most western sources use low-sulfur fuels (the sulfur content per million BTU's has a direct impact on total SO_2 emissions).

6. Smelter SO_2 emissions in the western U.S. have decreased by 72 percent since 1970 and, under current law, will continue to decrease.

7. The drier climate of the West results in less acid formation in the atmosphere.

8. Much of the West has a typically alkaline soil which provides buffering capacity with respect to acidic reactions.

WRC POSITION ON ACID RAIN

Based upon these and other factors, the Western Regional Council advocates the following position on acid rain.

The Western Regional Council believes research results should be the basis upon which any additional acid deposition control measures are designed. Consequently, we advocate accelerated research to better understand the causes and effects of acid precipitation. Since overall costs of reductions in emissions to reduce acid precipitation are estimated in the billions of dollars, no new major legislative program should be implemented without an assessment of and reasonable connection between costs and benefits.

If after careful review of research results and data Congress legislates to reduce acid precipitation, the Western Regional Council believes that regional variations and state flexibility must be taken into account.

Initial control efforts should be applied to both stationary and mobile sources in regions where significant acid precipitation problems exist (or where damage has occurred). To ignore mobile sources would place an inequitable burden on stationary sources and fail to address a potentially significant portion of the problem.

Initial control efforts should also provide that any emission reductions be achieved in phases with the results of a first phase providing additional scientific data upon which the reduction program can be assessed and additional reduction phases determined. We are not recommending what level of reductions, if any, should be sought. However, we do believe that future reductions should be in response to research results. We support continued research efforts.

Sources should be permitted use of the most cost effective methods available to achieve emission reductions. A facility should be allowed to decide how to achieve the reductions in the most cost-effective manner and in a way that makes sense for the plant's location, anticipated life, contractual arrangements, anticipated load demands, and other factors.

Some recent proposals have included provisions mandating the use of control technology. We strongly oppose that approach. Mandatory scrubbing has nothing to do with the environmental problem of acid rain, but instead, with preserving midwestern high sulfur coal mining jobs. Coupling forced scrubbing to preserve jobs with a national cost sharing program for purposes of political coalitions obscures the important environmental goals.

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There are also environmental costs associated with a mandatory scrubbing scenario. About 3 1/2 tons of sludge must be disposed of for each ton of SO_2 removed by conventional scrubbing. A 10 million ton reduction with mandatory scrubbing will require disposal of 35 million tons of sludge annually.

In addition, mandatory scrubbing negates the possibility of achieving early SO_2 reductions. Coal washing, fuel blending, or fuel switching can be implemented quickly to achieve major initial reductions in sulfur dioxide emissions from coal fired power plants, reductions which would be delayed by the design and installation time required for scrubbers. By producing earlier program reductions, they would achieve greater cumulative benefits over the life of an SO_2 reduction program.

Proponents of protecting high sulfur coal mining jobs claim there would be severe regional economic dislocation without mandatory scrubbing. We believe that the miner displacement issue is an overemphasized consideration in the acid rain debate. Studies indicate that if <u>all</u> affected utility sources were to select non-scrubbing options for emission reductions there would be some shifts in high sulfur vs. low sulfur coal mining employment and location. However, a more likely scenario under legislation allowing flexibility

would involve a mix of solutions for power plants. Some would likely install scrubbers even if not mandated. A review of the 50 largest emitters indicates that 11 are mine mouth power plants and would probably install scrubbing capacity. Two are retrofitting with scrubbers. The remaining number will and should be given the option to use the most cost effective control systems.

Overall increases in total coal mine employment projected over the next 15 years would also lessen the impact. Some employment shifts would also be confined within individual states.

Regarding funding for emission reductions, it must be understood that Western coal-fired power plants and smelters are already being required to install state-of-the-art technological controls at enormous expense. For power plants, these controls were imposed despite the relatively lower emission levels in the region due to use of low sulfur fuels. Electrical users in the West are already paying for these controls and their operation and maintenance. These costs have been borne by the utilities and their customers. Likewise, smelters in the West have borne the cost of expensive controls (but are unable to pass the costs to customers since they deal in an internationally traded commodity). We can see no equity in proposals to spread the costs of emission reductions beyond

the individual source. We oppose a national fee or tax on utilities, consumers, fuel or other proposals that would shift the financial burden from the polluter.

Because of our present investment in emission control, it should be understandable that we in the West oppose supporting the cost of emission reductions in other regions of the country. Spreading of such costs is unfair to those who have accepted their own responsibility and are already paying for emission reductions. We also believe that a spreading of the cost removes incentives for sources to seek cost effective emission controls. However, this question, "who pays?", has become a driving issue in much of the political debate on acid rain controls. We should not consider in environmental legislation the idea that the last ones to comply, the last ones to clean up, should be compensated for their delay.

Various proposals to address the problem of acid precipitation have included a cap on emission levels. At any one time there are factors which will influence the levels of emissions beyond control measures. Levels of consumption will fluctuate with weather patterns, fuel costs, conservation practices and other factors. Plant operations themselves and specific industry circumstances can dramatically influence the emission

levels for any one year or time. Also, caps unfairly discriminate against areas expecting growth, such as the West and the South. We therefore oppose inclusion of emissions caps in legislation.

Finally, any program of reductions should take proper cognizance of control steps already being taken or planned by existing sources in compliance with current regulations. Since sources in the West have already made or are planning reductions at significant cost, we should not be penalized and should receive full credit for such reductions in any future control program.

We have found much agreement in the West among our Governors and business organizations on these acid rain recommendations. We believe they make economic sense and are environmentally sound.

We will be glad to provide further information regarding any specific acid rain proposals or legislation upon request.

CLEAN AIR ACT REAUTHORIZATION/REVIEW

Before concluding, the WRC wants to emphasize that while we agree the acid rain issue deserves careful attention, we believe it would be unfortunate if it were to deprive other

important clean air issues of thorough consideration. If acid rain legislation is considered in Congress, it should be reviewed in concert with other amendments to the Clean Air Act. These issues are highly interactive and should be considered together.

Our recommendations on clean air legislation address prevention of significant deterioration, visibility, percentage reduction requirements under the New Source Performance Standards, primary nonferrous smelter orders, fugitive dust, and as previously outlined, acid rain.

Prevention of Significant Deterioration

The WRC recommends retention of annual average PSD requirements for Class I areas but elimination of short term increments. We also recommend dropping Class II and III designations. The retention of NSPS or BACT, as applicable, as an integral part of the PSD program will assure that new sources will utilize the best pollution control equipment available.

Short term increments in particular add unnecessarily to the complexity of the PSD program, due primarily to the lack of credible models. Because of the inherent uncertainty in modeling results, a PSD permit application is essentially

automatically subject to challenge by project opponents. Total atmospheric loading and long-term maintenance of low ambient concentrations are much better indices of air quality protection. These are more accurately predicted and measured by the long term increments than by short term air quality fluctuations measured by short term increments. Studies and case histories reveal that allowable source emissions have almost uniformly been dictated by the BACT or NSPS standards. The increment system has not resulted in significant air quality improvements beyond those resulting from the application of BACT or NSPS.

As noted by the National Commission on Air Quality, the most pronounced effect of the continued use of the increment system, and in particular use of short term increments, would be felt by those industries which are already restricted in terms of siting alternatives. Mining and certain energy developments must locate where resources are found if they are to locate at all; they are limited in their ability to relocate in order to meet increments. The short term increments may be a significant future constraint upon western resource development while offering very little by way of improvement to regional air quality.

We recommend that NSPS be reviewed and updated on a regular basis and that independent BACT reviews be eliminated for those categories of sources for which NSPS have been defined.

Visibility

The visibility issue has its greatest impact in the West. Of the preliminary identified Park Service integral vistas listed in the Federal Register of January 15, 1981, 120 of the 188 are located in the western states. The WRC opposes the integral vista concept. It is not a part of the Clean Air Act and it would extend Federal jurisdiction far outside the boundaries of Class I areas, frustrating state, local, and private land use decision making roles. Expanding the Federal agency jurisdiction through the device of integral vistas would have staggering potential ramifications for western resource development.

Many of the Park Service integral vistas are far larger than the parks in which they originate and cover huge expanses of state and privately owned lands. One vista reaches out 175 miles to California's coastal range from the Class I area encompassing Mount Whitney. As another example, developmental decisions in nearly one third of the State of Utah would be at the discretion of the National Park Service. By unfortunate coincidence that portion of Utah contains sizeable coal, tar sand, oil shale, and oil and gas resources.

The Western Regional Council believes the protection of visiblity over state and privately owned lands should be a state responsibility and not dictated by a federal land manager of a nearby or remote mandatory Class I area. Furthermore, we advocate amending the Clean Air Act to clarify that the visiblity protection program is intended to protect visibility only "within" the Class I areas.

We also advocate insertion of the word "significant" in Section 169 A of the Statute to reflect that the visibility program is intended to prevent or remedy "significant" impairment of visiblity in mandatory Class I areas rather than "any" impairment. This provision recognizes that the current state of visibility monitoring and modeling is inadequate to permit definitive predictions of visibility impacts. It eliminates the potential problem of de minimus, perceived, inconsequential, infrequent, or virtually non-observable impairment leading to permit challenges and denials.

NSPS Percentage Reduction Requirements

The 1977 amendments to the Clean Air Act impcsed a special requirement for fossil fuel fired stationary sources. In addition to meeting an emission limitation, like all other new sources, these facilities must achieve a percentage reduction in emissions without respect to the cleanliness of the fuel burned. In effect, this provision mandates the use of costly

scrubber technology, thereby penalizing consumers as well as producers of low sulfur coal and provides a disincentive for replacing older, less efficient facilities.

The provision is counterproductive to the goal of clean air, since low sulfur fuels can often be burned without scrubber technology and still achieve lower sulfur emissions than a source using high sulfur coal and the best scrubber technology available. Large amounts of energy and money are used to build, operate, and maintain scrubber technology when lower emissions can be achieved through the use of cleaner fuels.

The requirement was conceived in the belief that higher sulfur eastern and midwestern coal needed market protection form low sulfur western coal. Since 1977 the fallacy of this perception has been exposed. Abundant low sulfur coal exists in the East and Midwest. Due to transportation costs, differences in heating values and state taxation policies, western coal is not always competitive in eastern coal markets.

We urge the Congress to remove the percentage reduction requirement from the Act. Fossil fuel fired stationary sources, like other sources, should be able to use the most economical means available to meet emission limitations including use of low sulfur fuels.

Primary Nonferrous Smelter Orders

The WRC supports efforts to amend Section 119 of the Act to provide continued flexibility for nonferrous smelters.

Fugitive Dust

The WRC recommends inclusion of a provision in legislation to resolve potential problems in increment calculations involving fugitive dust from unsurfaced roads, agricultural activities and mining related activities particularly in the West.

We support amending Section 163 (c)(1)(C) of the statute to allow the Governor of a state with an approved PSD state implementation plan to exclude emissions of fugitive dust for the purpose of determining PSD increment consumption, and further, to provide that in a state that does not have PSD permitting authority, the EPA administrator may, and upon petition by the Governor he shall, discount emissions of particulate and certain other emissions for the purpose of determining PSD increment consumption.

Under the present ill-defined PSD provision of the Act, the EPA has struggled for years in an attempt to find a means of distinguishing fugitive dust from other particulate emissions. The need for this distinction results from the fact

that most fugitive dust consists of large non-inhalable, non-toxic particles which are localized and do not have adverse effects on public health or welfare. The WRC believes that particles which pose significant adverse health and welfare impacts should be regulated and particles which do not present similar adverse impacts should not be subject to regulation under the Act in the same manner.

In conclusion, we appreciate the interest of this Committee in air quality in the West and the opportunity to provide the Western Regional Council's unique western perspective to your review of western acid rain. We will be pleased to respond to any related questions or provide additional information.

Summary Position of the
Alliance for Clean Energy

by

Harry L. Storey
President
Alliance for Clean Energy

Senator Hart, Members of the Committee, I am Harry L. Storey, President of Storey & Associates, Denver, Colorado.

I am appearing before you today as the President of the Alliance for Clean Energy. The Alliance for Clean Energy is a coalition of coal producers, transporters and consumers with over 35 member companies who would be directly impacted by pending acid rain legislation. ACE membership includes most of the low-sulfur coal producers in the United States, with members in the East and West.

ACE recognizes that acid rain is one of the most difficult issues facing the Congress and the country today. The environmental and economic consequences of legislating, or not legislating, a solution are enormous. Yet there remains substantial disagreement among experts about the science surrounding the causes and effects of acid rain.

ACE does not offer judgement on the state of the science of acid rain nor are we supporting any particular piece of legislation.

The essence of the ACE position is that if Congress decides to enact acid rain control legislation, it should be the most cost effective. To be cost effective it must permit utilities to freely make the best economic choice between switching to low-sulfur coal and scrubbing.

The ACE position of "freedom of choice" is based on several simple, but compelling arguments.

Supply of Low Sulfur Coal

There are vast quantities of low sulfur coal reserves in the U.S. Approximately 217 billion tons, of which 16 billion tons, 7.6 billion in the east and 8 billion in the west, are classified as current economically recoverable reserves. Sixty-five percent of total U.S. coal reserves are low-sulfur, capable of meeting a 1.2 pound per million Btu sulfur dioxide emission standard without using scrubbers.

Current production of low sulfur coal is approximately 300 million tons per year with an additional in-place production capacity of 200 million tons. There is ample low sulfur coal production to meet any near term, 1985-1995, demand. Fifty percent of this excess capacity, 100 million tons, would produce a reduction in current sulfur dioxide emissions of six to seven million tons per year.

Cost of Scrubbing - versus - Use of Low Sulfur Coal

Environmental legislation should set standards, not dictate the method of compliance. A recent Congressional Office of Technology Assessment study concluded that mandatory scrubbing would cost U.S. consumers $1.4 billion per year more than freedom of choice, for the same environmental results. ICF, Inc. placed the savings of a freedom of choice policy at $2 billion per year. A savings of $20-30 billion to consumers between 1985-2000.

Mandatory Scrubbing - Who Should Pay

The polluter should pay. There is no equity in a national tax that would require consumers who are currently paying for sulfur dioxide reductions in their states, to pay for sulfur dioxide emission controls in those states that have elected not to reduce their SO_2 emissions. Environmental legislation must not reward those who elect to be the last to comply. Many U.S. consumers are currently paying approximately 25 percent of their electric cost for environmental controls.

SO_2 can be Reduced Faster by Using Low Sulfur Coal

Early reductions of SO_2 are very important if there is any basis for the concern of near-term acid rain damage. Switching to low-sulfur coal could be accomplished in two or three years. A capital intensive mandatory scrubbing program would take five to seven years to obtain equal SO_2 reductions. The "freedom of choice policy" would eliminate approximately $20 billion of front end capital, provide additional time for new technology development and allow in-course correction as research data becomes available and indicates a change is needed.

The Job Issue

Coal mining employment in the U.S. has doubled since 1970, and will increase an additional 40 percent by 1995. It is a growing industry, projected to create an additional 100,000 jobs, during the next ten years. Under a "freedom of choice policy", 17 states would gain more than 1,000 jobs; two states, Illinois and Ohio, would lose a total of 17,000 jobs over a ten year period. Approximately 50 percent of these workers in these job slots will be eligible for retirement during this period. There should be concern about these job losses. This job situation could be resolved by retraining and/or relocation to other coal producing areas. To protect these job losses through mandatory scrubbing legislation, the U.S. consumer would be required to subsidize these jobs and high sulfur coal production at a rate of approximately $100,000 per job per year, which is more than twice the current annual compensation for these jobs. It is clear that the job impact of "freedom of choice legislation" is far from the catastrophe some would have you believe.

In conclusion, ACE is interested in the above principals if acid rain legislation is enacted. We do question the economic and environmental rationale of mandatory scrubbing legislation that increases the cost of SO_2

reductions by approximately $2 billion per year for the same environmental result and, in addition, creates another environmental problem, sludge from scrubbers. There is approximately three tons of sludge generated for each ton of SO_2 removed. Where will the U.S. safely store an additional 20 to 30 million tons of sludge per year and what will be the cost? Acid rain legislation should not be designed to protect special interests. It must not provide an artificial or subsidized market for either fuel or hardware. The U.S. consumer is and will continue to pay the cost for environmental controls. They should not be overcharged for the product they receive.

U.S. SENATE

COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS

An Acid Rain Prevention Program For the West

Prepared by Robert E. Yuhnke

On Behalf of The
Environmental Defense Fund

The Sierra Club

and

The Wyoming Outdoor Council

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August 12, 1985

INTRODUCTION

The Environmental Defense Fund (EDF) is honored to have an oppportunity to share with this Subcommittee the research we have conducted into acid rain in the West. EDF has been working on the acid rain issue in the East for many years, and has brought that experience to bear on developing strategies aimed at preventing acid pollution damage in the West. It would be a monument to human folly if we as a nation fail to apply the knowledge gained from experience with acid pollution in the Northeast, Canada & Scandinavia to prevent damage to the pristine lakes in our western high country. Reasonable strategies are available to prevent acid pollution damage in the West. But if we fail to take preventive action, pollution trends in the West can be expected to cause the acidification of many of the highly sensitive high altitude lakes in the West.

This statement summarizes what is known about the acid rain threat in the West, the sources of SO_2 and NO_x pollution that contribute most to deposition, SO_2 and NO_x pollution trends in the region, and strategies designed to reduce projected increases in SO_2 and NO_x pollution in the Rocky Mountain region. Finally, we recommend specific amendments to the Clean Air Act that would be necessary to implement the pollution control strategies. These proposed amendments are summarized in an attachment to this statement.

THE EVIDENCE OF ACID POLLUTION EFFECTS IN THE WEST: A SUMMARY

Unlike the deserts and plains of the West, the pristine lakes of the high country in the Rockies, the Sierras and the Cascades are among the most acid sensitive environments on the face of the planet. The high country of the Rockies cradles more than 7,000 lakes. A similar number are found in the Sierras and Cascades. Many lie on granite bedrock, surrounded by the sheer walls of glacial cirques, above the protecting mantle of forest. Exposed to winds carrying pollutants a thousand miles or more, these lakes have little, if any, of the natural ability to neutralize acids. Many are so vulnerable to acid pollution that with 10 times less acid, they could suffer as much damage as some lakes that have already been acidified in the Northeast.1/

During snowmelt this spring and last, acidified lakes were found in the Rockies.2/ Lakes adjacent to the Snowmass Wilderness were found to have a pH of 4.9 for a month during snowmelt. Snow traps acid pollution for 7-9 months, then releases it into lakes over a short period. During that period, the lake became 70 times more acid than it normally is.

The death of a lake is the final event in a sequence of changes in lake chemistry. Before the acidity of a lake increases dramatically, the ability to neutralize acid, i.e., buffering capacity, must first be consumed. Studies in the Rockies indicate that buffering capacity is being consumed.3/ If declines in buffering capacity continue, some lakes could be acidified, threatening the survival of trout and other aquatic species.

Short-term acidification occurs when the acid entering the lake exceeds its buffering capacity and is a warning signal that a lake is on its way to being permanently acidified. Because of the difficulties of access only a handful of high country lakes are being studied intensively enough to detect short-term acidification episodes.4/ But there is every reason to believe that if it is occurring at lakes where researchers are looking, it is likely to be happening at hundreds of other lakes as well.

In 1983 and 1984, biologists found in high country lakes populations of trout and salamanders that have failed to successfully reproduce.5/ The eggs and young of these species are known to be highly sensitive to the acidification of their habitat.6/ Experience in the Adirondacks tells us that the failure of these species to reproduce is one of the early symptoms of acidification. Since egg hatch often occurs during snowmelt, the increased acidity during snowmelt in the Rockies is thought to explain the failure of salamanders to reproduce. Native trout have also failed to reproduce in high lakes that are part of Boulder's drinking water supply.7/ We don't know if this is caused by acid rain, but the isolated location of these lakes suggests atmospheric imputs may be a cause.

Current levels of acid pollution are already causing the early stages of acidification, i.e., loss of buffering capacity and episodic acidification during snowmelt. This is consistent with the effects caused by acid deposition in other regions. Precipitation pH at or below 4.7 is associated with the acidification of poorly buffered watersheds in areas where lakes are acidified. The pH of precipitation at the few high altitude

measurement stations show precipitation in this range. These values are in sharp contrast to the precipitation pH being measured at lower elevation NADF sites throughout the West. At the lower elevations where wind-blown alkaline soil material contributes to deposition, precipitation pH's are well-above levels that would give cause for concern. But above 9,000 feet where the sensitive lakes are, precipitation pH at some sites is low enough to cause significant changes in the environment.

Fortunately, we have not yet found dead lakes in the Rockies, but given what is happening to the high country and the expected increases in regional emissions of acid pollutants in the next 10 to 20 years, acid lakes may not be long in coming.

Both the pH of rain and snow in the high country, and the amount of sulfur pollution entering the lakes is near or above levels that have caused the acidification of mountain lakes in Scandinavia.[8/] Acid pollution levels in Colorado are expected to increase substantially as new coal-fired power plants throughout the West, a new smelter in Mexico, and synfuels projects in Colorado and Utah are built.[9/] A little foresight argues that we take preventive measures now before we push our Rocky Mountain lakes over the brink. Do we need to wait until we have destroyed some mountain lakes before we heed the evidence from Scandinavia that our poorly buffered lakes are already at the limit of what they can tolerate?

Given what we have learned about acid rain from other parts of the globe, we have the opportunity to prevent the devastation that has occurred in other regions. Prevention does not mean

preventing growth. It does mean ending the legal exemption for copper smelters, and requiring them to clean up their emissions as other sources have been required to do. It also means installing the best available pollution controls on new sources of SO_2 and NO_x. Acid lakes need not be the price of growth in the West, but they will be if we fail to heed nature's warning signals.

ACID RAIN PREVENTION STRATEGY FOR THE WEST

EDF recommends a five-part strategy to protect the West. A strategy for the West should be designed to accomplish two goals: 1) reduce emission of acid-forming pollutants from existing sources to provide a cushion for growth, and 2) provide a tool for limiting the growth in emissions from new sources so that acid deposition into sensitive lakes does not reach levels at which damage can be expected to occur. The first can be achieved if the current Clean Air Act deadline for smelter compliance with SIP emission limitations is enforced on ths U.S. side, and Mexico is persuaded to require a similar level of control (90% sulfur removal) on its smelters. EDF has performed an analysis that compares data from government acid rain sampling stations throughout the West with reported changes in SO_2 emissions from major polluting sources in the Intermountain West. This analysis shows an extremely strong correlation between changes in SO_2 emissions and changes in sulfur deposition throughout the region. See Oppenheimer, et al., "Acid Deposition, Smelter Emissions and the Linearity Issue in the

Western United States," Science (in press) [attached]. If this correlation between smelter SO_2 emissions and sulfur deposition in the Rockies holds for future changes in emissions, then these two steps should reduce regional sulfur deposition in the Rockies to tolerable levels for one to three decades. The amount of time depends on how quickly we add more SO_2 pollution from new sources (e.g., power plants, synfuels projects, gas-sweetening plants), and the contribution of nitrogen oxide (NO_x) pollution to total acid deposition.

1. U.S. Smelter Clean-up

In the Intermountain West (east of the Sierra Crest and west of the Continental Divide), smelters account for about 70% of the SO_2 emissions from all sources.[10/] All but two of the operating smelters are in compliance with SIP emission limitations or are under compliance agreements. The remaining two smelters (Phelps Dodge in Douglas, and Magma in San Manuel, Arizona,) are giant emitters accounting for about one-third of all SO_2 in the region. Magma is now negotiating a compliance agreement with Arizona that hopefully will be acceptable. Phelps Dodge, however, has said publicly it would close whenever the deadline arrives, but has always fought to postpone the deadline as long as possible.

Achieving final compliance at Douglas and San Manuel will reduce their SO_2 emissions from 550,000 tons per year (T/yr) to 150,000 T/yr, or 400,000 tons from those two sources alone. This represents nearly a 25% drop in SO_2 loadings in the entire Intermountain region.[11/]

Research by EDF shows that smelter emissions dominate sulfur

deposition throughout the Rocky Mountain region. See Oppenheimer, et al. The data demonstrate a tight correlation between changes in smelter emissions, and changes in sulfur deposition. This correlation supports the conclusion that reducing smelter emissions will produce a corresponding decline in sulfur deposition into high country lakes. Clean-up by Douglas and San Manuel should result in reducing sulfur deposition rates by about 20%, i.e., to levels that can probably be tolerated by sensitive mountain watersheds, provided major increases in pollution are not added by new sources.

RECOMMENDATION:

Congress should close loopholes opened by two recent EPA rulemaking decisions that allow opportunities for U.S. smelters to avoid compliance by the deadline agreed to by all parties in 1977, i.e., January 1, 1988. See proposed Amendments attached hereto.

2. Mexican Smelters

The smelters in Mexico are an equally critical part of an acid rain strategy for the West. While cleaning up the last two U.S. smelters will reduce emissions by 400,000 tons/yr, the new smelter at Nacozari, Mexico, will add nearly 500,000 tons/yr. If Nacozari is not controlled but U.S. smelters are, there will be no net reduction in SO_2 loadings in the Southwest. This will allow current sulfur deposition rates to continue, thereby continuing the present threat of acid damage to sensitive lakes and leaving no room for increased pollution from new sources.

To date no binding commitment has been made by Mexico to

control emissions from Nacozari. The communique issued by EPA and its Mexican counterpart, SEDUE, on July 19 in Tijuana, contains no commitments. No level of control has been agreed to, and Mexico claims it lacks legal authority to require the installation of pollution controls.

RECOMMENDATION:

The U.S. must seek controls on Nacozari that are comparable to those required for U.S. sources (about 90% SO_2 removal). There also is a need for some mechanism to ensure that the controls are maintained and operated.

3. New Source Pollution

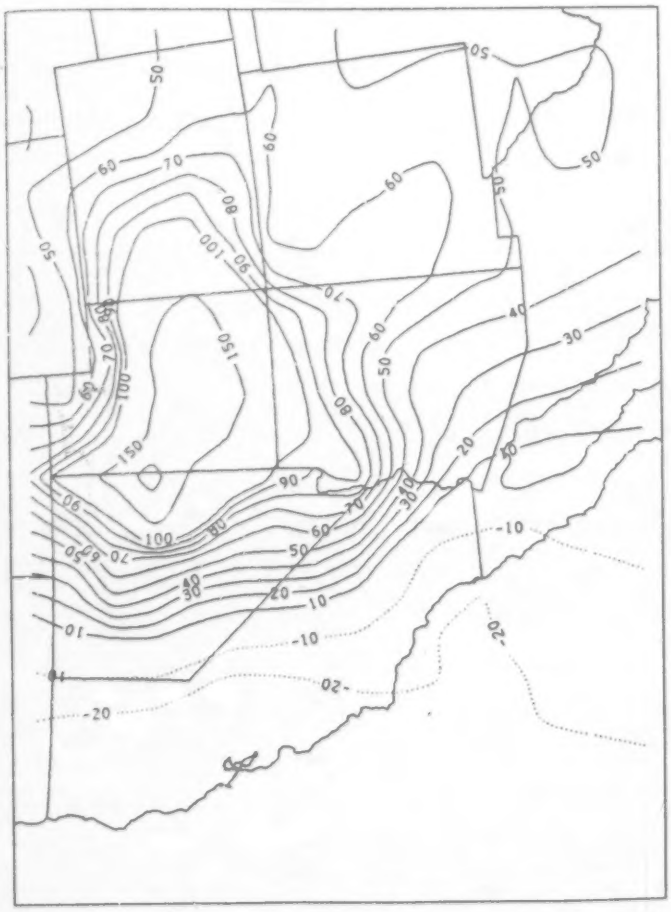
A prevention program for the West must be designed to change projected pollution trends in the region. Acid pollutants (SO_2 and NO_x) are increasing faster in the Rocky Mountain West than in any other region. Projected increases in acid pollutants can be expected to accelerate significantly current effects on acid-sensitive lakes.

A recent EPA study[12/] of pollution trends in six southwestern states from 1980 to 1995 estimates that SO_2 emissions in the Intermountain region will increase by 15% even if U.S. smelters comply with SIP emission limitations (1.8 million tons/yr to 2.1 million tons/yr), and NO_x emissions will increase by 40% if a moderately sized synfuels industry is developed in the oil shale and tar sands regions of Colorado and Utah (1.16 million tons/year to 1.9 million tons/year). More important than emission totals, the new large sources of NO_x will be much closer to the high country lakes that are most at risk

than are current sources. As a resu't, EPA's regional pollution study predicts that nitrate concentrations in the high country of western Colorado will increase by 100% by 1995 even if no oil shale industry is built. See Figure 5-29 from EPA study. If oil shale is built, these increases will be more dramatic. EPA has already decided that increases of this magnitude cannot be tolerated by high country lakes in Colorado.

The total amount of new pollution that will be added in the West from new sources will be determined by the amount of pollution control required for each source. Current law has generally been effective in achieving significant emission reductions for new SO_2 sources, but not NO_x. The reason is that various provisions of the Act have forced the development of more efficient controls for SO_2 over the last 10 years, but not for NO_x. In the West, the combination of increments for SO_2 under the "prevention of significant deterioration" (PSD) program and the requirement for "best available control technology" have alternately pushed the use of new technologies and then required their routine use. As a result, powerplants now routinely achieve 90% control, synfuels plants 95% control and gas sweetening plants 98% control. Until now, similar removal technologies have not been required for NO_x sources.

Major point sources will contribute 92% of the 1995 SO_2 inventory, and 72.3% of the NO_x inventory in this region. Major point sources of NO_x, i.e. power plants and synfuels projects, will account for more than 100% of the growth in the NO_x inventory because EPA estimates that total mobile source emissions in this region will decrease as more stringent tailpipe



Systems Applications, Inc

FIGURE 5-29. Percent change in annual average nitrate (total) concentrations from 1980 to 1995 (base scenario).

standards for heavy duty vehicles are phased in and older autos are replaced with vehicles meeting the 1.0 gr/mile standard.

If one looks beyond the 10 year horizon of the EPA study, both mobile source and stationary source emissions can be expected to increase further under current regulatory policies. Electric utilities plan to add 14,000 megawatts of new capacity in the Rocky Mountain region, only half of which is accounted for in EPA's projections to 1995. In addition, if synfuels are developed in the region, inventories will continue to grow after 1995. Thus without a strategy designed to restrain emissions growth, twenty years from now SO_2 emissions in the Intermountain region can be expected to increase by 30% and NO_x emissions are likely to double. These trends are ominous in view of evidence showing that western high country lakes are threatened by current levels of acid deposition.

a. NO_x Control Strategy for New Sources

Next to control of SO_2 by U.S. smelters and Nacozari, the highest priority for the West must be a strategy aimed at restraining the growth of the NO_x inventory. Assuming current tailpipe standards remain in effect, this strategy needs to focus on major stationary sources

Projected inventories show that NO_x will increase five to eight times faster than SO_2, largely because large stationary sources of NO_x are not required to install emission reduction technologies, whereas SO_2 sources are being required to meet high levels of emission control.

NO_x controls are being used in Japan and California on power

plants and refineries to achieve 80-90% NO_x reduction. California has promulgated a new source standard for power plants that requires this level of control. The NO_x technology uses selective catalytic reduction to reduce the NO_x to elemental nitrogen and oxygen. Capital costs are similar to SO_2 controls. But prior to June 1985, no U.S. source outside of California non-attainment areas has been required to use NO_x control technology.

The Chevron Clear Creek Shale Oil Project is the test case for the use of NO_x control technology on new sources in the U.S. For the first time, EPA decided that technology developed by the Japanese to remove more than 80% of NO_x emissions is "best available control technology." EPA required Chevron to achieve this level of NO_x control in a permit for Chevron's new oil shale project on Colorado's West Slope, about 45 miles from the Flat Tops Wilderness.

This decision was driven by EDF's evidence that current levels of acid deposition threaten wilderness lakes,[13] and that acid pollution added by Chevron could tip the lakes over the brink. Thus this decision reflects EPA's conclusion, as well as EDF's, that acid rain represents a serious threat to the West.

The Chevron case also demonstrates the threat posed by NO_x pollution. While 60% of the acid being deposited in the Rockies from existing sources comes from sulfur oxide pollution, it is apparent that NO_x will soon exceed SO_2 as the major threat in the West if major NO_x emitters are not controlled. Because of the increments for SO_2 in the current Prevention of Significant Deterioration program, new sources of SO_2 (e.g. power plants, synfuels projects and gas sweetening plants) are being required

to install highly efficient pollution controls ranging from 90 to 98% removal of SO_2. As a result, new source SO_2 emissions will grow relatively slowly. But the same is not true for NO_x.

Chevron's shale plant is the first source ever required to achieve 80% NO_x control by EPA. This requirement was imposed only because of the close proximity of this large source of NO_x to pristine wilderness lakes. It will be much harder to present evidence linking a more distant NO_x source with direct effects on lakes given the limitations in the modeling science. A proposed new source hundreds of miles away will make a small contribution to a specific lake. If the impact of such a source is assessed in isolation, it will be hard to persuade a permitting agency to require controls on that source. But collectively, emissions transported long distances from the many new power plants and synfuel projects planned for Utah, Wyoming, Colorado and New Mexico will nonetheless contribute to large increases in NO_x loadings and nitrate deposition over the next 10-20 years if NO_x removal requirements similar to the Chevron permit are not imposed.

RECOMMENDATION:

To address this problem, EDF recommends that an increment for NO_x be added now to the PSD program. The increment for SO_2 is currently the most effective tool for restraining SO_2 pollution growth because it forces the use of best technology regardless of where the source is located. A PSD increment for NO_x will restrain regional NO_x loadings as well. It needs to be enacted soon because many projects

are seeking permits now even though they may not be built for many years. Once issued, the permit is a permanent license to pollute.

b. Standards Limiting Total Acid Deposition.

Ultimately, sensitive high altitude lakes will be protected only if a limit is set that prevents acid deposition rates in excess of the amount these lakes can safely tolerate. Strategies aimed at slowing down the growth of SO_2 and NO_x inventories, such as PSD increments, can postpone the day of reckoning, but an enforceable limit on acid inputs to sensitive lakes needs to be set. In some areas such as the San Juan Mountains of southwestern Colorado, these limits may already have been reached. In other areas faced with the concentrated development of major new sources near sensitive high country lakes, such as Colorado's oil shale region, regional growth strategies will not provide adequate protection.

Strategies aimed at controlling regional loadings and long-range transport of pollutants do not consider the total impact of regional pollution combined with the increased localized impact of major sources built within relatively short distances (up to about 100 miles) of sensitive mountain terrain. One or more large new sources upwind of a sensitive area can have a dramatic impact on nearby lakes even though regional loadings of acid pollutants are reduced below current levels. These impacts will still need to be carefully evaluated. Limits on total acid deposition need to be set to ensure that clusters of local sources do not result in the destruction of sensitive lakes.

A good example of this localized effect on a major new

source is provided by the Chevron shale project. In its final permit decision, EPA concluded:

> [EDF] stated that in the Chevron's analysis, submitted to EPA, the hydrogen ion concentrations attributable to the project are 25% higher than the background. The commentor requested that EPA not consider Chevron in isolation, as their impact may be relatively small, but in combination with other new sources where the combined impact will cause adverse effects. This statement on H ion is true and Chevron has altered their submission on acid deposition impacts. In this case, we believe that Chevron will not cause an adverse impact when the additional NO_x controls are installed.

EPA agreed that the sensitive lakes in the nearby wilderness area clearly could not tolerate a 25% increase in acid deposition above that attributable to regional pollutant loadings. Nearby sources represent a significant threat that demands special attention.

But while EPA recognized that Chevron's uncontrolled emissions would be excessive when added to "background" deposition rates, EPA refused to identify a numerical limit on the amount of acid deposition that would be allowed. Exercising its responsibilities as the Federal Land Manager for the Class I wilderness area, the U.S. Forest Service had recommended a limit of a decrease in lake pH not to exceed 0.1 pH unit. EPA refused to adopt this limit, and refused to provide an alternative. Thus EPA made a seat-of-the-pants judgment that Chevron's emissions would not cause an "adverse impact" on the Class I lakes if NO_x controls are required, but EPA did not set a limit on the amount of degradation that would be allowed.

This basic policy question needs to be resolved by Congress. In the Clean Water Act, Congress has already defined the national

goal for the protection of the nation's waters. This goal has been implemented by State water quality standards. Those standards include limits on the degradation of pristine waters, and standards for pH. The Water Act policies and standards should serve as the basis for setting limits on tolerable rates of acid deposition. Once set, such standards would protect all lakes and not just those few that happen to be located inside the boundaries of a Class I area.

RECOMMENDATION:

EDF therefore recommends that Congress require the establishment of acid deposition standards by the States, or if necessary by EPA, and that such standards be required to limit acid deposition rates to levels that would insure, at a minimum, protection of water quality standards. SIP revisions should be required for sites whose sources contribute to violations of deposition standards.

4. Protecting National Parks and Wilderness Areas (Class I Areas)

Acid deposition standards set to ensure compliance with water quality standards may not achieve the high degree of protection required by the National Park Organic Act or the Wilderness Act for Class I areas. The Clean Air Act now requires that any "adverse impact" on a Class I area be prevented. Section 165(d)(2)(C). Water quality standards may, for some waters, allow degradation compared to baseline water quality. Thus even if deposition standards of general application are set by the States, the Act should continue to provide authority for Federal Land Managers to require higher levels of protection for

Class I parks and wilderness.

To achieve the level of protection for parks and wilderness that Congress originally intended, the Act needs to be clarified. The key provision of the Act is the language establishing protections for "air quality related values" (AQRVs) in the Class I Parks and Wilderness. The AQRV concept is defined by statute to include visibility, but otherwise is open to interpretation. The Federal Land Managers have added other impacts such as vegetation damage and acidification of lakes to the list of AQRVs. Some of these impacts are now being observed at current levels of pollution. But apparently nothing can be done to remedy these impacts under current law.

Because Congress specifically mandated that existing visibility impairment be remedied (Sec. 169A) by use of best available retrofit technology, but no similar provision applies to other types of park damage, Federal Land Managers arguably have no recourse against existing pollution that does not cause visibility degradation. Some state agencies and even EPA staff have gone so far as to conclude that existing pollution should not even be considered when assessing the impact of a proposed new source. In other words, if acid rain damage is occurring now at a park or wilderness, this should be ignored when considering whether a new source will cause an "adverse impact" on AQRVs. Thus if a new source can be shown to cause an "adverse impact" by itself, the law will protect the park. But if a source will only exacerbate an adverse impact caused by existing pollution levels, nothing can be done. This interpretation relies on the concept of a "baseline date" in the PSD program which only holds sources

accountable for consumption of a PSD increment if they are new after that date. But this concept makes no sense if the goal is to protect a resource that is affected by air pollution rather than a numerical increment. A lake doesn't know if the acid pollution comes from an old source or a new one. It responds to the total amount.

Current law provides that if a PSD increment in a Class I area is exceeded, a SIP revision will be required to reduce pollution. This same procedure is not now available if pollution levels below the level of the increment cause harm to park or wilderness resources or if the increment is waived by the FLM who later finds that the increased pollution is causing harm to the park or wilderness. It makes no sense to be able to force emission reductions when a numerical value is exceeded, but not be able to reduce emissions when they are found to be harming resources the law is intended to protect.

RECOMMENDATION:

This gap in the Act needs to be corrected. The law should make clear that total pollution is relevant to determining adverse impact, and that if the Federal Land Manager discovers existing pollution levels are causing an adverse impact, then the SIP revision procedure should be available to trigger a reduction in pollution levels, and not just stop new sources from getting permits.

CONCLUSION

The evidence demonstrates that current levels of SO_2 and NO_x

pollution in the Intermountain West represent a serious threat of acid pollution damage to poorly buffered lakes in the high country in various parts of the West. If we are to prevent damage to this priceless resource, now is the time to act.

Reasonable steps are available to keep acid deposition within safe levels. These include 1) reducing SO_2 emissions in the region by completing the process of cleaning up U.S. smelters, 2) obtaining commitments from Mexico to achieve enforceable SO_2 emission reductions at Nacozari comparable to those required for U.S. smelters, 3) implementing a strategy designed to restrain increases in NO_x pollution, 4) setting limits on the amount of acid that may be deposited into sensitive watersheds so as to prevent exceedances of water quality standards, and 5) clarifying ambiguities in the current protections for national parks and wilderness areas that are designated Class I. These recommendations are set out as specifications for amendments to the Act. (See attachment.)

FOOTNOTES

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(c)Harte, J., G.P. Lockett, R.A. Schneider, H. Michaels, and C. Blanchard. "Acid Precipitation and Surface-Water Vulnerability on the Western Slope of the High Colorado Rockies." Accepted for publication in Water, Air, and Soil Pollution.

(d)Stuart, S. 1984. "Hydrology and Aquatic Chemistry of Monitor Lake Watersheds in the Wind River Mountains, Wyoming." U.S. Forest Service. Bridger-Teton National Forest, Wyoming.

(e)U.S. Environmental Protection Agency, Region VIII: unpublished data of lake chemistry for 137 lakes in Mt. Zirkle Wilderness Area, Colorado.

(2) (a)Roth, P., C. Blanchard, J. Harte, H. Michaels, and M.T. El-Ashry. 1985. "The American West's Acid Rain Test." Research Report #1. World Resources Institute. p. 15.

(b)Harte, J. 1985. Statement made at the 1985 meeting of the Wyoming Outdoor Council. Jackson, Wyoming. June 15, 1985.

(3) (a)Kling, G.W. and M.C. Grant. 1984. "Acid Precipitation in the Colorado Front Range: An Overview with Time Predictions for Significant Effects." Arctic and Alpine Research 16(3): 321-329.

(b)Harte, J. 1985. Statement made at the 1985 meeting of the Wyoming Outdoor Council. Jackson, Wyoming. June 15, 1985.

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(b)Baron, J. Description of lake studies at Rocky Mountain National Park, given at the Acid Deposition Symposium. Boulder, Colorado. January 30-February 1, 1985.

(5) (a)Harte, J. 1984. Statement presented at the Western Water Workshop, Western State College, Gunnison, Colorado. July 23, 1984.

(b)Harte, J. 1985. Statement presented at the 1985 meeting of the Wyoming Outdoor Council. Jackson, Wyoming. June 15, 1985.

(c)Windell, J. 1984. Paper presented at the Long Term Ecological Research Workshop, sponsored by the Institute of Arctic and Alpine Research. University of Colorado, Boulder, Colorado. April 2326, 1984. [Full text not published; data obtained by phone conversation with Prof. Windell, August 7, 1984.]

(6) (a)Hendrey, G.R., ed., 1984. Early Biotic Response to Advancing Lake Acidification. Volume 7 of the Acid Precipitation Series, J.I. Teasley, series editor. Butterworth Publishers, Boston.

(b)United States: Canada Memorandum of Intent on Transboundary Air Pollution. 1983. Work Group I, Impact Assessment.

(7) Windell, J., 1984, op cit.

(8) (a)Swedish Ministry of Agriculture. The 1982 Stockholm Conference on Acidification in the Environment, Report S103 33. Stockholm, June 2830, 1982.

(b)Swedish Ministry of Agriculture. 1982. "Acidification Today and Tomorrow."

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(9) (a)Yuhnke, et.al., 1984, op.cit.

(b)Systems Application, Inc., February, 1985. "Modeling Regional Haze in the Southwest: A Preliminary Assessment of Source Contributions."

(10) Yuhnke, et.al., 1984, op.cit., p. 22.

(11) EPA's study "Modeling Regional Haze in the Southwest: A Preliminary Assessment of Source Contributions" (SAI, February, 1985) shows 1980 SO_2 emissions in the Intermountain region to be about 1.8 million tons/year.

(12) "Modeling Regional Haze in the Southwest: A Preliminary Assessment of Source Contributions," Systems Applications, Inc., February, 1985.

(13) Yuhnke, et.al., 1984, op.cit., pp. 1218.

CLEAN AIR ACT AMENDMENTS*

FOR ACID RAIN PREVENTION IN THE WEST

I. SMELTER CLEAN-UP AND COMPLIANCE WITH SO_2 EMISSION LIMITS.

A. Clarify §119(c)(1) and (d)(4) to state that second non-ferrous smelter orders (NSO's) must contain increments of progress and a schedule for achieving compliance with the postponed implementation plan requirement by January 1, 1988.

B. Clarify that compliance extensions under §113 are limited to December 31, 1985 (i.e., three years after statutory attainment deadline), and that smelters may obtain extensions beyond that date under §119 only.

C. Require revocation of NSO if a smelter fails to comply with National Ambient Air Quality Standards (NAAQS) during the term of the NSO.

II. NEW SOURCE EMITTERS OF ACID FORMING POLLUTANTS--SO_x AND NO_x

A.(1) Establish a program that would lead to the adoption of acid deposition standards by the states to protect acid sensitive waters that would include--

a) protection of water quality standards already adopted under the Clean Water Act as a goal;

b) account for the deposition of both sulfur and nitrogen-based acid-forming materials (i.e., establish a limit for <u>total</u> acid deposition);

c) require the inclusion of deposition standards

*All references are to the Clean Air Act, 42 U.S.C. 7401 et seq.

into State implementation plans so that they are enforceable under the federal Act across state lines (i.e., sources seeking permits to construct in upwind states would have to account for compliance with standards in downwind states);

d) set a three year deadline for state adoption of standards in those states where "sensitive" waters are present, i.e., streams or lakes with alkalinities less than EPA's guideline of 200 ueq/liter;

e) require EPA to start federal promulgation of deposition standards if the State has not commenced a rulemaking proceeding to adopt standards within two years of enactment, and require final federal standards to meet the three year deadline, or a permit moratorium for new sources would apply until standards are set, similar to §§110(a)(2)(I) and 167.

f) amend section 126 to recognize state acid deposition standards, and clarify that the section applies to multiple sources, i.e. "source regions."

B. Amend §165(e)(3) by adding language to the required impact analysis that includes "water quality and aquatic resources."

C. Require NOAA and EPA to jointly develop an atmospheric/meteorological monitoring program that would generate data needed to identify patterns of

atmospheric transport for various regions of the country. Such data are needed to make it possible to identify areas that are "upwind" of sensitive waters, and to calculate the impact that emissions from new sources are likely to have on downwind areas that are beyond the range of EPA's traditional modeling guideline, i.e., 50 kilometers.

D. Add to 163(b) new increments for nitrogen dioxide (NO_2) designed to require the use of advanced pollution control technology. Set the increments using the same ratio between the increment and the NAAQS as was used to set the increment for the annual SO_2 standard. The annual SO_2 standard is the appropriate comparison because both SO_2 and NO_2 are gaseous pollutants having similar dispersion characteristics, and the NAAQS for NO_2 consists only of an annual standard. The annual NAAQS for NO_2 is 100 ug/M^3. The NO_2 annual increment would therefore be:

(b)(1) Class I Areas -- 2.5 ug/M^3

(b)(2) Class II Areas -- 25 ug/M^3

(b)(3) Class III Areas -- 50 ug/M^3

III. MOBILE SOURCES.

Light and heavy trucks are major emitters of NO_x and are uncontrolled compared to autos. As a result they constitute nearly half of all mobile source NO_x emissions even though they comprise less than 20% of the vehicles in the fleet.

Add tailpipe NO_x standards identical to those contained in

H.R. 3400 for this class of vehicles.

IV. CLARIFY PROVISIONS PROTECTING NATIONAL PARKS AND WILDERNESS FROM ADVERSE IMPACTS UNDER SECTION 165.

A. Make clear that the assessment of "adverse impacts" is based on the cumulative impact of projected new pollution to be added by a proposed new source combined with effects from existing source pollution and other permitted sources not yet in operation. This is needed to eliminate the position taken by some states that effects caused by existing sources are not to be considered under the PSD program when determining adverse impacts.

B. Clarify authority to require SIP revisions if "adverse impacts" on national parks and wilderness are found. EPA's PSD regulations require a SIP revision when the Class I increment is exceeded. But the increment is not mandatory, and is not a firm limit on air pollution in Class I areas. SIP revisions should be allowed if adverse impacts are found at levels below the increment or after the increment has been waived.

C. Provide for public notice and opportunity for comment and public hearing on decisions by the Federal Land Manager (FLM) regarding what constitutes an "adverse impact" on Class I areas under §165(d)(2).

D. Provide for judicial review in federal court of FLM decisions under §165(d)(2).

E. Clarify section 165(d)(2)(C)(ii) to eliminate ambiguity which the EPA has said allows states to set Park or Wilderness

protection goals different than those set by the FLM.

V. AIR QUALITY RELATED VALUES INVENTORY

A. The Federal Land Manager charged with direct responsibility for management of mandatory Class I areas should be required to identify those air quality related values (AQRV's) that are present in each area and identify the air pollutants that are now affecting, or have the potential to adversely affect, those areas.

VI. REDESIGNATION OF NEW NATIONAL PARKS CREATED AFTER 1977 AND AREAS IDENTIFIED UNDER SECTION 164(d).

A. Redesignate from Class II to Class I those lands proposed by the Secretary of the Interior for reclassification pursuant to Section 164(d) and published in the Federal Register on June 25, 1980 (list attached).

B. Redesignate from Class II to Class I those national parks or park additions established after 1977 of 10,000 acres or more (list attached).

VII. INTEGRAL VISTAS.

A. Add explicit integral vista language to § 169A. Make clear that the State decides whether or not or how much to protect the vistas. (as per EPA rules) The State would simply have to find that other factors (energy, economics, etc.) outweigh the adverse impact on the vista.

B. Incorporate the definition developed by EPA and NPS for "integral vistas," as published in the Federal

Register: "The perception from within the Federal Class I area of a specified historical, cultural, scenic, or scientific landmark or panorama which is located outside the boundary of a Federal Class I area, which vista is important to the visitor experience of the area or the fundamental purpose for which the area was established and preserved."

VIII. EXISTING SOURCE NO_x CONTROLS.

Require major fuel combustion sources (utilities and industry boilers) to apply best available retrofit technology to control NO_x emissions.

NATIONAL PARK LAND RECOMMENDED FOR REDESIGNATION AS CLASS I

	Acreage	Contiguous Acreage Already Class I
ALASKA		
National Parks:		
Denali	2,426,000	1,939,493
Gates of the Arctic	7,052,000	
Glacier Bay	3,878,269	
Katmai	5,330,126	
Kenai Fjords	567,000	
Kobuk Valley	1,710,000	
Lake Clark	2,439,000	
Wrangell-St. Elias	8,147,000	
Total	31,549,395	
National Preserves		
Aniakchak	466,238	
Bering Land Bridge	2,774,182	
Denali*	1,335,380	
Gates of the Arctic*	943,327	
Glacier Bay*	54,948	
Katmai*	410,473	
Lake Clark*	1,405,487	
Noatak	6,557,204	
Wrangell-St. Elias*	4,872,953	
Yukon Charley Rivers	2,516,821	
Total	21,337,013	

*Lands contiguous to the national park.

	Acreage	Contiguous Acreage Already Class I
CALIFORNIA		
National Parks:		
Channel Islands	249,354	109,027
Redwood	48,000	403,023
Sequoia	16,000	
Total	313,554	
NEW MEXICO		
National Parks:		
Chaco Canyon	33,989	
OREGON		
National Parks:		
Crater Lake	24,000	160,290
TEXAS		
National Parks		
Big Bend	21,250	708,118
FLORIDA		
National Parks		
Biscayne	174,643	

CLASS II AREAS RECOMMENDED BY THE DEPARTMENT OF INTERIOR FOR REDESIGNATION TO CLASS I

	Acreage	Federal Wilderness Areas Already Designated Class I
ARIZONA		
Chiricahua NM*	10,648	9,400
Canyon de Chelly NM	83,840	--
Organ Pipe Cactus NM	330,689	312,600
Saguaro NM	83,578	71,400
Sunset Crater NM	3,040	--
Wupatki NM	35,253	--
Paiute Primitive Area	35,092	--
Paria Canyon Primitive Area	27,515	--
CALIFORNIA		
Death Valley NM	2,067,795	--
Joshua Tree NM	559,960	429,690
Lava Beds NM	46,821	28,460
Muir Wood NM	554	--
Pinnacles NM	16,216	12,952
Chemise Mountain Primitive Area	3,941	--

*NM = National Monument

COLORADO		
Black Canyon of the Gunnison NM	13,672	11,180
Colorado NM	20,445	--
Dinosaur NM	211,053	--
Great Sand Dunes NM	36,827	33,450
Powder Horn Primitive Area	40,400	--
FLORIDA		
Big Cypress National Preserve	570,000	--
Fort Jefferson NM	47,125	--
IDAHO		
Craters of the Moon NM	53,545	43,243
MONTANA		
Beartrap Canyon Primitive Area	2,861	--
Centennial Primitive Area	24,166	--
Humbug Spires Primitive Area	7,041	--
NEVADA		
Death Valley NM*	2,067,795	--
NEW MEXICO		
Bandelier NM	36,971	23,267
Capulin Mountain NM	775	--
El Moro NM	1,270	--
Gila Cliff Dwellings NM	533	--
White Sands NM	145,335	--

*NM = National Monument

	Acreage	Federal Wilderness Area Already Designated Class I
OREGON		
John Day Fossil Beds NM	14,402	--
SOUTH DAKOTA		
Badlands NM	242,302	64,250
UTAH		
Dinosaur NM	211,053	--
Cedar Breaks NM	6,155	--
Natural Bridges NM	7,779	--
Paria Canyon Primitive Area	27,515	--
Dark Canyon Primitive Area	57,248	--
Grand Gulch Primitive Area	24,080	--
VIRGIN ISLANDS		
Buck Island Reef NM	880	--
WYOMING		
Devil's Tower NM	1,347	--
Fossil Butte NM	8,178	--
Scab Creek Primitive Area	6,680	--

*NM = National Monument

Southwest Environmental Service

Catalyst for responsible decisions on environmental issues

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TESTIMONY OF

PRISCILLA ROBINSON

ON RECOMMENDATIONS FOR AMENDMENTS

TO SECTION 119 OF

THE CLEAN AIR ACT

PRESENTED ON BEHALF OF

SOUTHWEST ENVIRONMENTAL SERVICE

BEFORE THE SENATE COMMITTEE

ON ENVIRONMENT AND PUBLIC WORKS

AUGUST 12, 1985

P.O. Box 2231, Tucson, Arizona 85702 • (602) 624-2353

TESTIMONY BEFORE THE SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS - AUGUST 20, 1985

My name is Priscilla Robinson. I am the Director of Southwest Environmental Service, a small nonprofit environmental clearinghouse located in Tucson, Arizona. I appreciate the opportunity to testify on problems in controling sulfur oxide emissions from Arizona smelters.

My testimony will focus on the need to amend section 119 of the Clean Air Act, the section that provides for a delay in compliance with sulfur dioxide emissions from copper smelters. My testimony will include: information on the regulatory status of western smelters; the magnitude of emissions from western smelters; problems created by ambiguous language in section 119 and mismanagement of the program by EPA; problems in enforcing an agreement between the U.S. and Mexico; recommendations for amendments to the Clean Air Act; and a discussion of environmental controls and the economic problems of the U.S. copper industry.

Regulatory Status of Western Smelters

Many changes have taken place since I testified before this committee in June of 1981. At that time EPA had not approved final emission limits for Arizona smelters. Two Arizona smelters, Phelps Dodge smelter at Douglas and Magma Copper Company smelter at San Manuel, had applied for first nonferrous smelter orders (NSO's) but no NSO's had been approved by either the state or EPA.

Final emission limits for Arizona smelters were not promulgated by EPA until January 14, 1983, fourteen days after the statutory termination for first NSO's. Although the State of Arizona had approved first NSO's for the two smelters in 1982, EPA never acted on these NSO's because the first NSO period expired before final emissions limits were promulgated. Provisions of these NSO's were never enforceable under federal law, and the public was never able to use the federal process to comment on deficiencies in the NSO's.

EPA's position in January, 1983, was that second NSO applications were not necessary and would not be considered until promulgation of the second NSO regulations. Second NSO regulations were proposed in September, 1983, but no further action was taken. The State of Arizona took the position that acting on the second NSO's was a waste of staff time since EPA had not promulgated second NSO regs. Consequently, the State would not consider NSO applications until the EPA regs were finalized. In the meantime, the two NSO smelters in Arizona, which are the largest sources of SO_2 in the western U.S., continued to operate without enforceable NSO's, controlled only by very generous interim emission limits.

Failure by the State and EPA to require NSO's enabled the Douglas and San Manuel smelters to avoid filing schedules of compliance and deprived the public of a mechanism to enforce the ambient air quality standards. This deadlock continued for almost two years.

In November 1984, the Environmental Defense Fund and a group of Arizona citizens, including myself and Dick Kamp, filed a law suit against the Douglas and San Manuel smelters, charging that they were in violation of the law because they had not filed schedules of compliance showing how they intended to meet the approved Arizona SIP deadline on January 14, 1986. We filed the suit because we were frustrated by the failure of EPA and the State of Arizona to adopt second NSO regs and get on with the regulation of these two smelters. We wanted to force the smelters to agree to schedules of compliance because we were concerned that EPA would allow the situation to drift until the deadline came, thereby setting up the smelters to ask for more time. We also wanted to be able to use the NSO's to force stricter enforcement of the ambient air quality standard.

The suit had the desired effect. Less than three months after we filed the suit, EPA promulgated rules for the second NSO's -- rules that had been pending for 17 months. The rules required the two smelters to file applications for NSO's. Both smelters have done so. The Douglas smelter filed its application with EPA and the San Manuel smelter with the State of Arizona. Hearings will probably be held on these applications this fall.

It is plain from this history that EPA had no intention of regulating these two smelters unless and until forced to do so by outside pressure. Today, eight years after the passage of the Clean Air Act Amendments, neither smelter has committed to a schedule leading to compliance with final emissions limits.

In the meantime the other western smelters have, without exception, either cleaned up or are closed. The smelters that remain open, Inspiration Copper Company at Miami, Arizona, ASARCO smelter at Hayden, Arizona, Phelps Dodge smelter at Hidalgo, New Mexico and Kennecott smelter at Chino, New Mexico, are all meeting their final emission limits. Five other smelters in Arizona, Utah and Nevada are closed. Some of these would be able to meet their final emission limits with either minimal or no improvements.

The recently modernized facilities at the ASARCO smelter at Hayden, Arizona and the Kennecott smelter at Chino, New Mexico are particularly interesting. Both of these smelters have recently installed modern furnaces that conserve energy and can be operated with far fewer operators. Because these furnaces produce a strong gas stream, nearly all of the sulfur dioxide is captured and converted to acid in the acid plant.

I want to make it clear that section 119 does not benefit the industry as a whole. It benefits only two smelters, the two

largest polluters and, in fact, is operating to give an unfair advantage to these two major polluters.

Magnitude of Western Smelter Emissions

Smelter emissions dominate the sulfur dioxide inventory in the intermountain west. In 1981, smelters were responsible for about 63% of total emissions. Power plants accounted for about 31%. Total SO_2 emissions from smelters in the intermountain west in that year were over a million tons, with Douglas and San Manuel accounting for 550,000 tons. These two giant emitters were responsible for about one third of all emissions in the intermountain west.

Although total smelter emissions are down because of modernization and reduced production resulting from of economic conditions, emissions from the two giants continues about the same. Total SO_2 emissions from all Arizona smelters in 1984 were slightly more than 600,000 tons, but Douglas and San Manuel together accounted or 470,000 tons, or about 75% of the total. As other western smelters come into compliance, these two constitute a growing percentage of total emissions.

When all western smelters are in compliance, total western smelter emissions will fall from over a million tons per year, the level in 1981, to less than 600,000 tons per year. This will create a cushion to accommodate new power plants and other energy development in the west. Total emissions from new energy related sources in the intermountain west within the next 20 to 40 years is estimated at about 200,000 to 300,000 tons per year, considerably less than the reduction achieved by bringing Douglas and San Manuel into compliance.

Emissions data for Arizona smelters for the years 1976 through 1984 is attached.

Problems in Section 119 of the Clean Air Act

Ambiguous language in section 119, repeated delays and an overgenerous interpretation of the law by EPA in the second NSO rules have created problems that impede implementation of the original intent of Congress.

The bargain that was struck in 1977 gave the smelters a ten year delay in installation of continuous controls. In exchange, the smelters were expected to maintain the ambient air quality standards and to begin research toward final compliance by January 1, 1988. The NSO smelters recieved the benefits of the delay, while other smelters came into compliance, but ambient standards are regularly exceeded by the NSO smelters. Neither smelter has filed a schedule of compliance showing how they intend to comply and, most serious of all, the enforceability of the 1988 deadline has come into question. The smelters got their

part of the bargain, but the public has been denied theirs.

The first of these problems is enforceability of the deadline. EPA, in its regulations for second NSO's, took the position that nothing in the NSO is enforceable after January 1, 1988. The problem becomes apparent in the Phelps Dodge application for an NSO recently filed with EPA. It contains a certification that the Douglas smelter will close by January 1, 1988. The certification is submitted in lieu of a schedule of compliance, as Phelps Dodge has stated repeatedly that they will close rather than modernize. However, the draft NSO also states that the NSO terminates on January 1, 1988. This is consistent with the EPA rules of February 15, 1985. Since nothing in the NSO is enforceable after January 1, 1988, the certification will be a meaningless piece of paper on January 2, 1988. This means that EPA or the state or, failing action by these agencies, a citizen will have to begin the enforcement process from the beginning by issuing a notice of violation and by going through the entire enforcement process. This process could easily take a full year or longer. We are asking that section 119 be clarified so that the agreement to close or comply is enforceable <u>after</u> the January 1, 1988 deadline.

EPA's overgenerous treatment of the smelter industry has created an additional problem with regard to the 1988 deadline. Although the Clean Air Act calls for attainment of standards for existing sources in nonattainment areas by December 31, 1982, EPA approved a deadline for compliance with final emissions limits of January 1986 for Arizona smelters. EPA's failure to promulgate final emission limits until 1983 created the dilemma in the first place. Although everyone has assumed that 1988 is the final deadline for smelter compliance, the option is now opened up for an additional three year extension under section 113, to January 1989. The 1986 SIP deadline for Arizona smelters was recently affirmed by a decision in the Ninth Circuit Court of Appeals. This loophole needs to be closed and the original 1988 deadline re-established.

The second problem concerns schedules of compliance. In final rules promulgated on February 15, 1985, EPA took the position that schedules of compliance are required only for smelters that need additional interim controls during the period of the NSO. Under EPA rules, schedules leading to compliance with final emission limits are required only if the Administrator has determined that controls are "reasonably available." Since this test is the same as the test for eligibility for an NSO, it follows that a smelter that is eligible for an NSO is automatically exempt from filing a schedule of compliance leading to compliance by 1988.

This paradox creates a problem with regard to the NSO for the San Manuel smelter. The NSO application submitted to the State of Arizona by San Manuel does not contain a schedule of compliance. Attorney's for San Manuel claim that none is required since an

admission that technology is "reasonably available" would be the same as an admission that the smelter is not eligible for an NSO. They claim that the smelter should be "free ... to continue research into more cost effective means of control, to seek further extensions from Congress, if necessary, or to close at the end of the NSO period." (Letter from Twitty, Sievright and Mills to James D. Vieregg Esq., Assistant Attorney General of the State of Arizona). However, the smelter has only two and a half years remaining before the deadline. The smelter has had eight years to research new technology, eight years during which other nearby smelters have modernized and come into compliance with final emission limits. Additional extensions from Congress do not appear likely. San Manuel management has stated publicly that they intend to comply, not shut down. Other actions taken by Magma Copper Company, such as the recent purchase of additional mining properties to supply concentrates to the smelter, reinforce the public impression that Magma intends to keep the smelter open.

The final problem concerns the maintenance of the health standard in areas close to the smelters. Although this issue only indirectly affects the acid rain question, we feel that by failing to issue NSO's and to use this tool to enforce the ambient health standard, EPA has failed to keep the bargain that was struck when section 119 was enacted. In exchange for granting a stay to smelters that could not afford controls, these smelters agreed to maintain the ambient standards at all times. The NSO regulations provide for areas of designated liability that would hold the smelters to this promise. However, since no NSO's have been approved, this mechanism has been denied the public.

Smelters assumed to be eligible for NSO's have continued to exceed ambient standards every year since 1977 without any enforcement action by EPA or the State. A summary of exceedances at Phelps Dodge smelter at Douglas for 1984 is attached.

As a result of EPA's mis-administration of this program, the industry has received eight years of the 10 year delay it was promised, but the public has yet to be protected by a federally enforceable obligation for smelters that have applied for NSO's to meet the ambient standards. EPA has effectively denied the public the health protection that Congress intended, and has relieved non-complying smelters of both the obligation to install controls and the obligation to protect public health.

This pattern of mis-administration by EPA is continued in the second NSO regulations. Despite extensive comments from the public requesting a demonstration by the smelter of its ability to attain the ambient standard <u>prior to</u> issuing the NSO, EPA failed to address this issue in the final rules. Further, it is not clear what penalties may be enforced against the smelter for failure to maintain ambient standards. Because of the long history of exceedances of standards and because of the reluctance

by EPA to enforce standards, we are requesting a provision calling for revocation of an NSO for failure to comply with the obligation to maintain the NAAQS during the term of the NSO.

Problems in Enforcing an Agreement between the U.S. and Mexico

The Joint Communique issued by U.S. and Mexican negotiators on July 18, 1985 in San Diego contained the following statements:

"The Mexican and United State National Coordinators agreed that the control of the Douglas and Nacozari smelters should be linked so that interim and permanent controls will be applied."

"With regard to the Douglas smelter, the U.S. Government gave a firm committment that the smelter will comply with the provisions of the Clean Air Act as soon as possible but no later than January, 1988."

Serious questions arise as to whether the U.S. can enforce this agreement on Phelps Dodge without changes in the law. EPA's rules of February 15, 1985 may well have given this power away.

I will not repeat the problems that will be created by the Nacozari smelter coming on line without controls, as these issues are addressed in Bob Yuhnke's and Dick Kamp's testimony. It is clear that, if the final compliance for Douglas is allowed to slip, the U.S. will have no basis to request compliance from Nacozari. The border region will be subject to extremely large amounts of pollution for an indefinite period and we can expect an increase in acidity in precipitation throughout the Rocky Mountain area. For these reasons, we feel that it is urgent that Congress amend section 119 to close all loopholes and require either enforceable agreements to close, or schedules of compliance, including increments of progress, by January 1, 1988.

Recommendations for Amendments to the Clean Air Act

The changes requested here do not represent new ideas. They are needed to re-establish Congress' original intent with regard to the smelter extension. Through delay and overgenerous interpretation of the law, EPA has succeeded in effectively nullifying the original agreement that formed the basis for section 119. Ambient air quality standards have not been enforced, no schedules of compliance have been approved and the public has been denied access to the process.

We are asking for the following changes in the law:

1. Clarify S119(c)(1) and (d)(4) to state that second non-ferrous smelter orders (NSO'S) must contain increments of progress and a schedule for achieving compliance with the postponed implementation plan requirement by January 1, 1988.

2. Clarify that compliance extensions under section 113 are

limited to December 31, 1985 (i.e., three years after statutory attainment deadline), and that smelters may obtain extensions beyond that date under section 119 only.

3. Require revocation of an NSO if a smelter fails to comply with the obligation to comply with NAAQS during the term of the NSO.

Environmental Controls and the Economic Problems of the American Copper Industry

It is sometimes claimed that environmental controls are one of the main causes of the economic plight of the copper industry. However, there is considerable evidence that this is not so.

To understand why this is not so, it is necessary to understand that the process of achieving compliance for a smelter is essentially the same as modernization. Copper concentrates contain very large amounts of sulfur, approximately as much sulfur as copper. During the smelting process, the sulfur combines with oxygen to form sulfur dioxide and is driven off as a gas. This gas may be captured and converted to elemental sulfur or to sulfuric acid and sold as a byproduct. The production of sulfur may be viewed as production of a useful by-product or as expensive air pollution controls depending upon the price of sulfur.

Conversion of the gas into acid is possible only when the gas is of sufficient strength. Gasses from some steps in the process, the roasters and converters, are strong enough to be treated in an acid plant. However, gasses from older furnaces are not strong enough to treat, and these gasses are sent up the stack. This is the present state of the San Manuel Smelter.

The process of bringing such a smelter into compliance consists of replacing the furnace with a modern furnace producing a strong gas stream. New furnaces also use less energy and can be operated with far fewer people. They can be operated all of the time, regardless of the weather, unlike smelters that operate with supplementary controls. The new smelter at Nacazari in Mexico will use an efficient modern furnace, even though no acid plant is planned. In other words, a modern furnace is not an air pollution control device.

There is evidence that modernization is making the industry more competitive. At the hearing before the U.S. International Trade Commission on May 15, 1984, the copper industry representatives made it plain that they believed that modernization could make them competitive with foreign producers.

Mr. Richard O. Cunningham, Esq., testifying for the industry, in explaining the relative effects of various external forces on the industry said "...overall U.S. industry costs have in fact been reduced during this period (1979-83). The U.S. industry is

modernizing, has been modernizing, and has become more efficient during the period."

"Specific types of costs that you might look to -- environmental costs I note particularly -- are a lesser factor for the industry now than they were in the previous period that you investigated. Increases in these costs then can't be a cause of injury to the U.S. industry." (pages 78 & 79 of the transcript) Industry spokesman went on to say that, given a five year period of relief from low cost imports, they believed they would be competitive with any nation in the world except Chile. The reason for this is superior technology, and new innovations by the U.S. industry, that can overcome the disadvantage of low grade ores.

Later in the hearing, in response from direct questions from a Commissioner, Mr. Cunningham restated the situation thusly, "There is no injury to the U.S. industry during this period from environmental costs." (page 202 of the transcript.)

The U.S. industry has made tremendous strides in efficiency in mining and processing of copper. U.S. industry is not being overtaken by technological changes in other countries. Most of the industry has responded to the challenge of foreign competition with great ingenuity. Modernization of most U.S. smelters has been part of this change.

Seen in this context, it is clear that the two aging giants that still seek exemptions do not represent the industry as a whole, but in fact represent part of the industry that is falling behind. Additional exemptions are not in the best interests of the industry as a whole, and are not necessary to meet foreign competition.

Copies of the quoted portions of the ITC Hearings are attached.

PHELPS DODGE - DOUGLAS 1984 SUMMARY

Month	EXCEEDANCES					
	3 Hr.	Station	Value	24 Hr.	Station	Value
January	Jan 19	Northwest	1389	--	--	--
February	Feb 13	East	1354	--	--	--
March	* Mar 1	Northwest	1843	--	--	--
	Mar 1	Curtis	1406			
April	April 5	AZ NE	1395	--	--	--
May	--	--	--	--	--	--
June	* June 4	AZ NE	1573			
	* June 5	AZ NE	1558			
	* June 6	AZ NE	1390			
	*June 10	AZ NE	1632			
	June 26	Mobil IV	1458	June 26	Mobil IV	437
	*June 26	Northwest	1441	June 26	Northwest	507
	*June 26	East	1607			
	June 26	Queen	1485			
	June 26	North	1528			
	*June 26	Mobil IV	1432			
July	--	--	--	--	--	--
August	--	--	--	--	--	--
September	*Sept 20	AZ NE	1577	--	--	--
October	* Oct 17	AZ NE	1543	--	--	--
November	--	--	--	--	--	--
December	--	--	--	--	--	--

The 3 hour standard is 1300 ug/m^3

The 24 hour standard is 365 ug/m^3

ARIZONA DEPARTMENT OF HEALTH SERVICES

ARIZONA DEPARTMENT OF HEALTH SERVICES

PHELPS DODGE CORPORATION - NEW CORNELIA BRANCH
EMISSIONS AND AIR QUALITY DATA SUMMARY

O.D.	MONTH	S INPUT T/OD avg	S EMITTED T/OD avg	% REMOVAL	# OF 3Hr EXCEEDANCES	SO2 EXP ug-hr/m3	# OF 24Hr EXCEEDANCES	SO2 EXP ug-hr/m3
313	YEAR 76	168.2	73.9	56.0	6	0	0	0
218	YEAR 77	167.0	60.5	63.8	2	732	1	984
258	YEAR 78	163.9	62.1	61.9	5	3083	2	3792
296	YEAR 79	182.8	85.5	53.0	0	0	2	1152
27	1 80	168.6	66.2	60.7	2	393	1	2184
27	2 80	168.2	60.8	57.6	1	60	1	1920
29	3 80	155.6	60.5	61.1	0	0	0	0
28	4 80	144.6	68.6	50.7	0	0	0	0
28	5 80	130.3	68.5	62.8	2	1116	0	0
27	6 80	150.6	94.2	37.4	2	1032	0	0
0	7 80	NO PRODUCTION THIS MONTH			0	0	0	0
0	8 80	NO PRODUCTION THIS MONTH			0	0	0	0
0	9 80	NO PRODUCTION THIS MONTH			0	0	0	0
21	10 80	104.1	75.6	48.1	0	0	0	0
30	11 80	115.8	64.8	61.7	0	0	0	0
31	12 80	155.3	72.5	53.3	2	600	0	0
248	YEAR 80	150.6	66.7	55.7	7	3201	3	4104
31	1 81	125.6	59.9	52.3	0	0	0	0
28	2 81	118.8	78.2	34.2	1	579	0	0
13	3 81	121.2	51.5	57.6	0	0	0	0
30	4 81	154.6	63.5	59.5	1	2703	0	0
30	5 81	139.4	53.7	61.3	1	8727	1	7561
30	6 81	163.7	65.4	60.0	0	0	0	0
24	7 81	151.5	51.0	65.0	0	0	0	0
16	8 81	155.7	64.4	58.6	1	240	0	0
30	9 81	170.2	74.0	30.0	0	0	0	0
31	10 81	138.2	54.0	61.0	0	0	0	0
29	11 81	160.3	68.0	62.6	1	108	0	0
23	12 81	194.5	72.6	62.7	0	0	0	0
315	YEAR 81	150.7	62.9	58.3	5	12429	1	7561
31	1 82	158.3	72.5	54.2	0	0	0	0
28	2 82	101.0	74.4	58.9	0	0	0	0
31	3 82	169.9	74.0	56.5	1	39	1	72
17	4 82	153.3	58.6	61.7	0	0	0	0
0	5 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	6 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	7 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	8 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	9 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	10 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	11 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	12 82	NO PRODUCTION THIS MONTH			0	0	0	0
197	YEAR 82	144.0	71.3	57.3	1	39	1	72
0	1 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	2 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	3 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	4 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	5 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	6 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	7 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	8 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	9 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	10 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	11 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	12 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	YEAR 83	0.0	0.0	0.0	0	0	0	0
0	1 84	NO PRODUCTION THIS MONTH			0	0	0	0
0	2 84	NO PRODUCTION THIS MONTH			0	0	0	0
0	3 84	NO PRODUCTION THIS MONTH			0	0	0	0
0	4 84	NO PRODUCTION THIS MONTH			0	0	0	0
0	5 84	NO PRODUCTION THIS MONTH			0	0	0	0
30	6 84	131.8	56.7	56.7	0	0	0	0
31	7 84	122.7	41.6	66.1	0	0	0	0
31	8 84	116.9	44.3	62.1	0	0	0	0
18	9 84	123.2	56.2	54.4	4	12591	2	18056
24	10 84	117.9	41.0	65.1	1	1714	0	0
30	11 84	117.1	45.7	61.0	3	3915	1	912
31	12 84	131.6	52.8	60.5	1	633	0	0
195	YEAR 84	123.3	48.0	61.1	9	19853	3	18968

PHELPS DODGE CORPORATION - MORENCI BRANCH
EMISSIONS AND AIR QUALITY DATA SUMMARY

O.D.	MONTH	S INPUT T/OD avg	S EMITTED T/OD avg	%S REMOVAL	# OF 3Hr EXCEEDANCES	SO2 EXP ug-hr/m3	# OF 24Hr EXCEEDANCES	SO2 EXP ug-hr/m3
345	YEAR 76	666.8	242.5	63.6	101	-9	49	-9
322	YEAR 77	581.1	201.6	65.3	81	56685	17	56496
344	YEAR 78	580.8	231.8	60.2	44	39744	11	24880
351	YEAR 79	560.3	210.9	62.4	27	18963	5	12312
31	1 80	488.2	213.4	56.3	7	2769	1	1392
29	2 80	513.8	253.8	50.7	10	6978	5	12432
31	3 80	433.3	211.8	51.1	1	15	0	0
30	4 80	571.9	267.6	53.2	9	7369	5	9624
31	5 80	564.8	172.1	69.5	2	488	0	0
30	6 80	420.2	130.3	67.1	2	555	0	1
0	7 80	NO PRODUCTION THIS MONTH			0	0	0	0
0	8 80	NO PRODUCTION THIS MONTH			0	0	0	1
0	9 80	NO PRODUCTION THIS MONTH			0	0	0	0
24	10 80	520.7	278.8	44.3	13	12162	6	24864
30	11 80	405.9	198.8	51.2	15	11937	5	7368
31	12 80	249.7	91.0	63.2	14	8577	6	10776
267	YEAR 80	461.1	201.4	56.3	73	52342	30	66456
31	1 81	372.8	169.5	54.4	7	3048	4	10560
28	2 81	346.5	115.1	66.8	7	7734	3	2448
31	3 81	438.0	178.4	60.4	6	3838	0	0
30	4 81	433.2	193.9	55.2	1	1734	0	0
31	5 81	567.5	277.6	51.1	7	4995	3	10416
30	6 81	536.8	258.4	53.3	8	7584	3	5712
31	7 81	485.5	285.8	49.2	11	17472	4	12120
31	8 81	451.8	237.5	47.3	7	6519	1	1704
30	9 81	308.5	145.1	61.9	5	2782	0	0
31	10 81	288.1	78.9	74.7	2	1182	3	5664
30	11 81	293.3	124.1	57.7	17	15747	10	10936
29	12 81	255.8	67.8	73.7	11	8424	9	21192
363	YEAR 81	397.8	169.8	57.2	89	84851	42	88752
31	1 82	287.6	186.2	48.9	6	4764	2	2448
28	2 82	225.8	55.8	75.2	1	345	0	0
31	3 82	221.1	38.9	82.4	3	3183	0	0
17	4 82	162.9	25.5	84.3	1	3141	0	1
0	5 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	6 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	7 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	8 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	9 82	NO PRODUCTION THIS MONTH			0	0	0	0
15	10 82	173.5	36.6	78.9	3	10125	1	8064
30	11 82	278.7	20.8	92.8	3	1398	0	0
31	12 82	209.1	73.6	74.5	1	633	0	1
183	YEAR 82	231.1	94.2	76.5	18	33587	3	18512
31	1 83	384.8	77.5	73.7	6	4718	2	4512
28	2 83	465.4	179.8	61.5	8	6363	1	4848
31	3 83	474.8	128.7	72.9	18	13838	5	17424
30	4 83	499.9	211.6	57.7	8	4835	0	0
31	5 83	477.3	129.9	72.9	6	4341	0	1
30	6 83	364.5	189.2	70.8	6	3881	0	0
31	7 83	246.3	66.4	73.8	3	1719	0	1
31	8 83	286.8	132.1	53.8	0	0	0	0
30	9 83	493.9	282.1	59.1	8	8887	5	9576
31	10 83	454.9	237.8	47.7	14	12285	5	7872
30	11 83	384.5	259.7	32.4	16	26265	7	42144
31	12 83	382.1	92.7	69.3	6	3861	5	6480
335	YEAR 83	398.4	152.3	61.8	91	89217	38	92856
31	1 84	314.2	136.4	56.6	6	5763	1	2304
29	2 84	343.8	187.5	60.7	2	561	0	0
31	3 84	431.5	148.8	65.7	6	6428	3	5496
30	4 84	351.8	185.6	78.8	2	2385	1	1888
31	5 84	446.3	159.4	64.3	7	7548	1	144
30	6 84	431.2	112.7	73.9	4	3964	1	1488
31	7 84	444.8	144.8	67.4	8	8	8	8
31	8 84	360.7	30.9	89.4	2	84	1	688
30	9 84	467.8	88.5	81.8	8	8	8	8
31	10 84	452.6	95.2	77.8	1	237	8	8
30	11 84	334.4	111.3	66.7	8	8	8	8
29	12 84	370.1	100.7	71.3	8	8	8	8
364	YEAR 84	397.4	113.2	71.5	38	36764	8	11112

PHELPS DODGE CORPORATION - DOUGLAS REDUCTION WORKS
EMISSIONS AND AIR QUALITY DATA SUMMARY

O.D.	MONTH	S INPUT, T/OD avg	S EMITTED T/OD avg	%S REMOVAL	# OF 3Hr EXCEEDANCES	SO2 EXP ug-hr/m3	# OF 24Hr EXCEEDANCES	SO2 EX ug-hr/
366	YEAR 76	537.6	532.4	1.0	8	-9	1	-9
323	YEAR 77	319.8	311.2	2.7	14	9615	1	584
356	YEAR 78	261.7	255.3	2.4	7	4296	0	0
365	YEAR 79	367.9	361.8	1.9	12	3411	4	10184
31	1 80	425.7	416.7	2.1	0	0	0	0
29	2 80	421.7	414.8	1.0	0	0	0	0
31	3 80	496.2	486.5	1.9	0	0	0	0
30	4 80	534.9	525.3	1.0	1	198	0	0
31	5 80	512.9	503.1	1.9	3	2001	0	0
30	6 80	456.0	446.7	2.0	0	0	0	0
0	7 80	NO PRODUCTION THIS MONTH			0	0	0	0
0	8 80	NO PRODUCTION THIS MONTH			0	0	0	0
0	9 80	NO PRODUCTION THIS MONTH			0	0	0	0
23	10 80	351.0	346.6	1.4	0	0	0	0
30	11 80	442.5	435.8	1.5	3	874	0	0
31	12 80	476.1	469.8	1.3	1	721	0	0
266	YEAR 80	468.7	462.4	1.8	0	3906	0	0
31	1 81	522.2	512.9	1.8	4	3588	0	0
28	2 81	537.8	528.2	1.6	2	267	0	0
31	3 81	523.8	514.7	1.7	2	1137	1	1464
30	4 81	511.9	502.9	1.8	1	315	0	0
31	5 81	482.8	473.4	1.0	3	319	0	0
30	6 81	292.6	288.8	1.6	0	0	0	0
31	7 81	387.3	383.2	1.3	0	0	0	0
31	8 81	333.7	329.8	1.4	4	1617	0	0
30	9 81	416.2	412.1	1.8	0	0	0	0
31	10 81	566.1	556.9	1.6	0	0	0	0
30	11 81	564.5	557.3	1.5	3	678	0	0
29	12 81	528.1	520.1	1.5	1	1287	0	0
363	YEAR 81	464.9	457.5	1.6	28	9728	1	1464
31	1 82	389.8	384.2	1.4	3	2553	1	168
28	2 82	332.1	326.6	1.6	0	0	0	0
31	3 82	176.2	174.7	0.8	0	0	0	0
17	4 82	177.1	175.1	1.2	0	0	0	0
0	5 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	6 82	NO PRODUCTION THIS MONTH			0	0	0	0
19	7 82	194.6	192.6	1.0	0	0	0	0
31	8 82	128.9	127.0	1.4	0	0	0	0
30	9 82	129.7	127.8	1.5	0	0	0	0
31	10 82	130.5	127.6	2.2	0	0	0	0
4	11 82	96.5	94.3	2.3	0	0	0	0
0	12 82	NO PRODUCTION THIS MONTH			0	0	0	0
222	YEAR 82	284.6	283.6	1.4	3	2553	1	168
0	1 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	2 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	3 83	NO PRODUCTION THIS MONTH			0	0	0	0
23	4 83	348.4	335.9	1.3	0	0	0	0
31	5 83	487.8	482.7	1.3	0	0	0	0
30	6 83	416.7	410.3	1.5	0	0	0	0
31	7 83	177.7	176.9	1.6	0	0	0	0
31	8 83	182.7	179.2	1.9	0	0	0	0
30	9 83	381.3	375.4	1.6	0	0	0	0
31	10 83	410.4	402.9	1.8	0	0	0	0
30	11 83	412.2	403.4	2.1	1	248	0	0
31	12 83	432.5	424.1	2.0	2	111	0	0
268	YEAR 83	351.4	345.4	1.7	3	351	0	0
31	1 84	366.5	359.2	2.0	1	267	0	0
29	2 84	398.5	391.3	1.8	1	162	0	0
31	3 84	489.5	483.8	1.6	2	1947	0	0
30	4 84	430.9	422.8	2.1	1	225	0	0
31	5 84	486.9	474.3	2.6	0	0	0	0
30	6 84	484.3	457.0	5.5	10	4312	2	5136
31	7 84	473.4	446.8	5.8	0	0	0	0
31	8 84	462.6	447.1	3.3	0	0	0	0
30	9 84	474.2	463.7	2.2	1	831	0	0
31	10 84	484.2	472.5	2.4	1	729	0	0
30	11 84	462.4	451.9	2.3	0	0	0	0
31	12 84	465.8	455.3	2.2	0	0	0	0
366	YEAR 84	458.1	437.1	3.9	17	10533	2	5136

ASARCO INC. - HAYDEN SMELTER
EMISSIONS AND AIR QUALITY DATA SUMMARY

O.D.	MONTH	S INPUT T/OD avg	S EMITTED T/OD avg	%S REMOVAL	# OF 3Hr EXCEEDANCES	SO2 EXP ug-hr/m3	# OF 24Hr EXCEEDANCES	SO2 EXP ug-hr/m3
366	YEAR 76	288.8	216.8	25.2	114	-9	106	-9
295	YEAR 77	297.7	179.6	39.7	102	83841	84	249264
362	YEAR 78	301.7	163.9	45.7	13	4928	9	8448
365	YEAR 79	264.3	169.4	35.9	48	63897	21	87168
31	1 80	287.7	183.5	36.2	6	9315	2	18824
29	2 80	312.6	157.3	49.7	8	0	1	1272
31	3 80	317.5	163.9	48.4	1	165	0	0
30	4 80	316.7	172.3	45.6	1	1512	1	4680
31	5 80	338.8	277.8	15.8	1	621	1	912
30	6 80	385.6	144.1	62.9	2	5813	1	4392
0	7 80	NO PRODUCTION THIS MONTH			0	0	0	0
0	8 80	NO PRODUCTION THIS MONTH			0	0	0	0
0	9 80	NO PRODUCTION THIS MONTH			1	1980	0	0
0	10 80	NO PRODUCTION THIS MONTH			0	0	0	0
0	11 80	NO PRODUCTION THIS MONTH			0	0	0	0
26	12 80	214.8	108.7	47.2	1	30	0	1
288	YEAR 80	277.5	174.3	41.8	13	18636	6	29280
31	1 81	241.2	115.2	52.2	1	66	0	0
28	2 81	258.3	106.2	57.6	1	1071	2	456
31	3 81	370.0	188.1	32.1	0	0	0	0
30	4 81	302.2	176.9	41.5	1	1716	0	0
31	5 81	327.3	145.2	55.6	0	0	0	0
30	6 81	289.3	131.4	54.6	1	2616	0	0
31	7 81	263.3	156.5	40.6	2	1117	0	1
31	8 81	289.5	156.5	45.9	3	2457	0	0
30	9 81	281.4	122.3	56.5	1	1903	0	0
31	10 81	292.6	138.4	52.7	3	2532	3	5856
30	11 81	177.6	98.8	54.1	3	744	4	3736
29	12 81	255.7	141.9	44.5	1	168	1	672
363	YEAR 81	281.3	138.8	50.7	17	14472	12	12720
31	1 82	287.1	140.1	51.2	4	1479	2	1680
28	2 82	301.8	132.8	56.3	2	2184	0	0
31	3 82	211.1	165.3	21.7	1	525	0	0
30	4 82	281.7	137.8	51.1	0	0	0	0
31	5 82	348.8	148.9	56.3	0	0	0	0
30	6 82	267.3	122.2	54.3	0	0	0	0
31	7 82	287.7	85.8	59.1	0	0	0	0
31	8 82	341.8	208.9	41.1	0	0	0	0
30	9 82	308.1	163.6	46.9	0	0	0	0
31	10 82	350.8	178.6	58.1	0	0	0	0
30	11 82	216.9	115.4	46.8	0	0	0	0
31	12 82	286.3	81.7	68.1	0	0	0	0
365	YEAR 82	277.2	139.1	47.7	7	4180	2	1680
31	1 83	241.5	122.6	42.8	0	0	0	0
28	2 83	236.3	114.5	51.5	0	0	0	0
31	3 83	353.5	134.5	47.8	0	0	0	0
30	4 83	191.4	103.3	46.8	0	0	0	0
31	5 83	165.6	76.2	54.8	0	0	0	0
30	6 83	206.1	106.6	48.3	1	1245	0	0
18	7 83	170.2	93.7	47.4	0	0	0	0
30	8 83	158.4	114.6	27.7	1	1122	0	0
30	9 83	187.0	107.9	42.1	0	0	0	0
24	10 83	148.4	89.7	36.1	0	0	0	0
22	11 83	165.3	62.7	62.1	0	0	0	0
29	12 83	178.4	31.8	82.2	0	0	0	0
326	YEAR 83	191.7	98.8	48.9	2	2367	0	0
29	1 84	215.9	2.3	98.9	0	0	0	0
27	2 84	261.5	4.2	98.4	0	0	0	0
30	3 84	321.3	20.3	93.7	0	0	0	0
27	4 84	482.7	25.8	93.3	0	0	0	0
29	5 84	319.6	15.8	95.1	0	0	0	0
27	6 84	414.2	3.8	99.3	0	0	0	0
29	7 84	369.8	2.9	99.2	0	0	0	0
30	8 84	392.9	8.3	97.9	0	0	0	0
28	9 84	483.8	19.8	95.1	0	0	0	0
25	10 84	337.4	8.1	97.6	0	0	0	0
25	11 84	278.6	4.4	98.4	0	0	0	0
1	12 84	11.8	6.8	45.5	0	0	0	0
387	YEAR 84	337.1	10.4	96.9	0	0	0	0

KENNECOTT MINERALS COMPANY - HAYDEN SMELTER
EMISSIONS AND AIR QUALITY DATA SUMMARY

O.D.	MONTH	S INPUT T/OD avg	S EMITTED T/OD avg	%S REMOVAL	# OF 3Hr EXCEEDANCES	SO2 EXP ug-hr/m3	# OF 24Hr EXCEEDANCES	SO2 EXP ug-hr/m3
310	YEAR 76	294.4	35.2	88.0				
304	YEAR 77	308.5	44.8	85.1				
322	YEAR 78	386.7	25.5	91.7				
315	YEAR 79	299.8	35.4	88.2				
30	1 80	323.1	62.6	38.6				
27	2 80	320.8	63.1	80.3				
28	3 80	271.1	48.9	86.8				
26	4 80	292.8	28.9	98.1				
31	5 80	295.9	48.4	83.7				
14	6 80	253.2	36.9	85.4				
0	7 80	NO PRODUCTION THIS MONTH						
0	8 80	NO PRODUCTION THIS MONTH						
16	9 80	230.8	37.8	84.5				
31	10 80	336.9	45.3	86.6				
28	11 80	400.2	94.4	76.4				
31	12 80	358.2	52.2	85.1				
262	YEAR 80	317.3	52.5	83.5				
29	1 81	314.5	38.2	90.4				
27	2 81	334.8	31.4	90.6				
31	3 81	385.8	66.1	82.9				
17	4 81	372.2	58.1	84.4				
30	5 81	337.3	27.7	91.7				
30	6 81	331.2	39.2	88.2				
31	7 81	331.4	52.4	84.2				
28	8 81	374.4	67.8	82.1				
27	9 81	380.1	28.2	90.8				
29	10 81	371.8	16.8	95.5				
29	11 81	383.1	69.5	77.8				
30	12 81	378.4	82.2	78.3				
338	YEAR 81	344.5	47.3	86.3				
31	1 82	358.5	67.7	38.6				
28	2 82	379.2	55.8	85.3				
30	3 82	338.3	46.0	86.2				
29	4 82	336.7	48.9	85.5				
0	5 82	NO PRODUCTION THIS MONTH						
0	6 82	NO PRODUCTION THIS MONTH						
0	7 82	NO PRODUCTION THIS MONTH						
0	8 82	NO PRODUCTION THIS MONTH						
0	9 82	NO PRODUCTION THIS MONTH						
0	10 82	NO PRODUCTION THIS MONTH						
0	11 82	NO PRODUCTION THIS MONTH						
3	12 82	NO PRODUCTION THIS MONTH						
118	YEAR 82	358.3	55.0	84.3				
0	1 83	NO PRODUCTION THIS MONTH						
0	2 83	NO PRODUCTION THIS MONTH						
0	3 83	NO PRODUCTION THIS MONTH						
0	4 83	NO PRODUCTION THIS MONTH						
0	5 83	NO PRODUCTION THIS MONTH						
0	6 83	NO PRODUCTION THIS MONTH						
0	7 83	NO PRODUCTION THIS MONTH						
0	8 83	NO PRODUCTION THIS MONTH						
0	9 83	NO PRODUCTION THIS MONTH						
0	10 83	NO PRODUCTION THIS MONTH						
0	11 83	NO PRODUCTION THIS MONTH						
0	12 83	NO PRODUCTION THIS MONTH						
0	YEAR 83	0.0	0.0	0.0				
0	1 84	NO PRODUCTION THIS MONTH						
0	2 84	NO PRODUCTION THIS MONTH						
0	3 84	NO PRODUCTION THIS MONTH						
0	4 84	NO PRODUCTION THIS MONTH						
0	5 84	NO PRODUCTION THIS MONTH						
0	6 84	NO PRODUCTION THIS MONTH						
0	7 84	NO PRODUCTION THIS MONTH						
0	8 84	NO PRODUCTION THIS MONTH						
0	9 84	NO PRODUCTION THIS MONTH						
0	10 84	NO PRODUCTION THIS MONTH						
0	11 84	NO PRODUCTION THIS MONTH						
0	12 84	NO PRODUCTION THIS MONTH						
0	YEAR 84	0.0	0.0	0.0				

INSPIRATION CONSOLIDATED COPPER COMPANY
EMISSIONS AND AIR QUALITY DATA SUMMARY

O.D.	MONTH	S INPUT T/OD avg	S EMITTED T/OD avg	% REMOVAL	# OF 3Hr EXCEEDANCES	SO2 EXP ug-hr/m3	# OF 24Hr EXCEEDANCES	SO2 EXP ug-hr/m3
316	YEAR 76	332.4	68.2	81.9	31	39549	10	33720
298	YEAR 77	317.6	67.2	78.8	58	109821	22	122544
338	YEAR 78	339.7	67.3	80.2	35	54844	14	66696
344	YEAR 79	323.8	68.6	78.8	56	112482	21	121512
31	1 80	311.3	16.9	94.6	2	5493	1	4752
28	2 80	207.4	60.8	71.4	3	2788	2	3048
31	3 80	384.1	51.9	86.5	0	0	0	0
30	4 80	337.0	24.7	92.7	0	0	0	0
31	5 80	314.8	33.8	89.2	1	117	0	0
29	6 80	271.8	39.2	87.8	3	2046	0	0
0	7 80	NO PRODUCTION THIS MONTH			0	0	0	0
0	8 80	NO PRODUCTION THIS MONTH			0	0	0	0
0	9 80	NO PRODUCTION THIS MONTH			0	0	0	0
5	10 80	271.0	65.0	76.0	0	0	0	0
30	11 80	370.8	45.0	87.9	0	0	0	0
30	12 80	332.6	35.1	89.4	4	6195	2	3681
245	YEAR 80	316.7	38.2	88.0	13	16551	5	11480
31	1 81	323.5	38.3	98.6	2	5528	1	6264
28	2 81	334.3	17.1	94.9	2	2487	0	0
31	3 81	333.5	38.9	00.3	0	0	0	0
30	4 81	295.9	35.7	87.9	1	1329	0	0
31	5 81	311.2	13.8	95.6	0	0	0	0
29	6 81	316.6	82.8	73.9	6	15825	1	17256
23	7 81	237.8	77.8	72.5	2	4311	1	1992
31	8 81	369.9	61.6	83.3	0	0	0	0
30	9 81	304.3	34.0	80.6	1	758	0	0
31	10 81	278.8	37.8	86.7	3	3255	1	1176
30	11 81	337.0	12.1	94.3	4	3006	2	2784
31	12 81	286.8	34.8	88.1	10	6087	4	8112
356	YEAR 81	315.6	39.6	87.5	31	42570	10	37584
31	1 82	343.4	74.9	78.2	18	34836	8	32992
26	2 82	323.7	184.4	67.8	28	47463	10	41896
31	3 82	328.2	78.3	78.6	6	3927	2	3912
30	4 82	346.4	-3.4	101.8	2	189	0	0
31	5 82	381.9	41.4	89.2	2	4431	2	5208
30	6 82	367.7	39.5	89.3	4	14988	1	5160
29	7 82	334.7	67.8	79.7	0	0	0	0
5	8 82	232.4	53.0	122.0	0	0	0	0
0	9 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	10 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	11 82	NO PRODUCTION THIS MONTH			0	0	0	0
0	12 82	NO PRODUCTION THIS MONTH			0	0	0	0
213	YEAR 82	344.4	53.8	84.6	62	104734	23	129168
31	1 83	217.7	31.3	85.6	1	1423	0	0
28	2 83	292.6	16.3	94.4	2	13791	1	14496
31	3 83	276.3	30.5	86.1	0	0	0	0
30	4 83	249.3	38.5	84.5	0	0	0	0
31	5 83	322.6	51.1	84.2	1	2481	0	0
30	6 83	389.8	47.5	84.6	3	2892	1	1392
0	7 83	NO PRODUCTION THIS MONTH			0	0	0	0
0	8 83	NO PRODUCTION THIS MONTH			0	0	0	0
6	9 83	170.2	94.8	32.6	0	0	0	0
31	10 83	229.6	14.4	93.7	0	0	0	0
4	11 83	138.5	21.3	85.9	0	0	0	0
0	12 83	NO PRODUCTION THIS MONTH			0	0	0	0
222	YEAR 83	266.5	35.5	86.7	7	20587	2	15888
25	1 84	313.7	54.2	82.7	1	459	0	0
29	2 84	282.7	60.8	78.5	1	3824	1	792
31	3 84	283.1	16.3	94.2	0	0	0	0
30	4 84	311.2	47.8	84.3	0	0	0	0
31	5 84	272.2	25.2	90.7	1	2712	1	240
30	6 84	296.7	37.5	87.1	0	0	0	0
30	7 84	259.2	39.5	84.8	0	0	0	0
31	8 84	276.8	38.6	01.7	1	1377	0	0
30	9 84	323.7	60.2	81.4	0	0	0	0
31	10 84	287.2	46.2	84.0	1	636	0	0
30	11 84	234.7	99.6	57.5	11	18672	4	18312
31	12 84	327.0	50.2	84.8	2	343	1	2352
337	YEAR 84	288.1	48.2	83.1	18	27223	7	21696

MAGMA COPPER COMPANY - SAN MANUEL DIVISION
EMISSIONS AND AIR QUALITY DATA SUMMARY

O.D.	MONTH	S INPUT T/OD avg	S EMITTED T/OD avg	% REMOVAL	# OF 1Hr EXCEEDANCES	SO2 EXP ug-hr/m3	# OF 24Hr EXCEEDANCES	SO2 EXP ug-hr/m3
365	YEAR 76	595.8	256.9	56.9	22	-9	12	-9
365	YEAR 77	599.4	278.7	53.5	22	26772	2	968
365	YEAR 78	550.8	301.1	45.3	24	22781	3	13248
363	YEAR 79	566.8	312.7	44.7	18	23760	6	12252
30	1 80	585.6	241.8	58.9	0	0	0	0
29	2 80	685.8	272.6	54.2	0	0	0	0
31	3 80	630.7	320.8	49.3	0	0	0	0
30	4 80	591.1	287.3	51.4	0	0	0	0
31	5 80	531.1	261.9	50.7	0	0	0	0
30	6 80	471.2	308.4	34.3	2	1254	0	0
2	7 80	939.8	918.8	2.2	2	2448	0	0
0	8 80	NO PRODUCTION THIS MONTH			0	0	0	0
0	9 80	NO PRODUCTION THIS MONTH			0	0	0	0
1	10 80	NO PRODUCTION THIS MONTH			0	0	0	0
29	11 80	554.9	274.3	50.6	1	488	0	0
28	12 80	639.6	282.6	55.8	2	279	0	0
241	YEAR 80	576.3	284.1	50.7	7	4752	0	0
30	1 81	650.8	276.4	54.4	0	0	0	0
28	2 81	784.5	344.6	51.1	1	597	0	0
31	3 81	778.7	343.7	55.0	0	0	0	0
30	4 81	674.6	291.4	56.8	0	0	0	0
31	5 81	690.6	276.6	60.1	1	246	0	0
30	6 81	643.6	281.8	56.2	0	0	0	0
30	7 81	676.4	275.7	60.1	0	0	0	0
31	8 81	748.6	305.5	59.2	0	0	0	0
30	9 81	684.7	317.6	53.3	0	0	0	0
31	10 81	664.1	272.1	59.0	1	429	0	0
29	11 81	784.4	335.2	52.1	1	687	0	0
28	12 81	668.9	297.8	55.1	5	3825	1	1800
359	YEAR 81	692.8	303.8	56.3	9	5784	1	1800
30	1 82	684.1	328.5	53.2	0	0	0	0
28	2 82	647.5	230.7	63.1	0	0	0	0
31	3 82	646.7	258.4	68.1	0	0	0	0
29	4 82	641.1	273.7	57.3	1	531	0	0
30	5 82	483.1	196.7	51.2	3	3747	1	3576
26	6 82	401.0	184.8	61.7	0	0	0	0
25	7 82	541.3	249.6	53.9	2	1764	1	528
26	8 82	488.5	207.9	57.4	0	0	0	0
25	9 82	518.5	254.7	50.9	0	0	0	0
31	10 82	428.8	174.9	59.4	1	453	0	0
29	11 82	437.6	167.2	61.8	0	0	0	0
23	12 82	345.9	122.8	64.5	0	0	0	0
333	YEAR 82	524.7	222.4	57.6	7	6475	2	4104
30	1 83	396.6	157.8	59.9	0	0	0	0
28	2 83	481.7	162.1	59.7	1	587	0	0
31	3 83	437.3	202.2	53.8	0	0	0	0
29	4 83	453.6	189.9	58.1	0	0	0	0
30	5 83	387.6	165.3	57.6	0	0	0	0
30	6 83	342.8	144.5	59.5	0	0	0	0
30	7 83	355.7	153.7	56.8	0	0	0	0
25	8 83	387.2	188.8	51.2	4	3759	1	1224
30	9 83	413.2	184.4	54.7	0	0	0	0
31	10 83	341.4	142.6	58.2	0	0	0	0
29	11 83	415.1	163.1	68.7	0	0	0	0
29	12 83	431.1	165.8	61.7	0	0	0	0
352	YEAR 83	398.7	168.5	57.7	5	4246	1	1224
30	1 84	344.8	146.2	57.5	0	0	0	0
29	2 84	423.7	146.1	65.5	0	0	0	0
30	3 84	441.6	153.9	65.2	0	0	0	0
28	4 84	446.0	162.1	63.7	0	0	0	0
30	5 84	423.1	164.2	61.2	0	0	0	0
27	6 84	443.8	187.7	61.7	0	0	0	0
30	7 84	468.4	192.6	58.9	0	0	0	0
31	8 84	571.1	221.1	62.5	0	0	0	0
29	9 84	712.9	264.8	62.9	1	159	0	0
31	10 84	821.7	321.7	58.0	0	0	0	0
29	11 84	793.3	279.2	64.8	0	0	0	0
29	12 84	769.1	293.8	60.1	0	0	0	0
353	YEAR 84	937.7	206.2	63.8	1	159	0	0

OFFICIAL TRANSCRIPT PROCEEDINGS BEFORE

THE U.S. INTERNATIONAL TRADE COMMISSION

Meeting of the Commission

Date: May 15, 1984

Time: 10:00 a.m. - 6:00 p.m.

Pages: 1 thru 262

PARTIAL TRANSCRIPT

UNWROUGHT COPPER

Investigation No. TA-201-52

ALDERSON REPORTING
(202) 628-9300

STEELWORKERS OF AMERICA, AFL-CIO;
SIMON HUNT, GRAHAM HACLIN, TERRY FRIESE-GREENE, AND ALLAN HALL, OF BROOK, HUNT & ASSOCIATES;
RICHARD O. CUNNINGHAM, ESQ., ROBERT W. FLEISHMAN, ESQ., SUSAN ESSERMAN, ESQ., NINA H. QUESTAL, ESQ., AND ROBERT T. NOVICK, ESQ., OF STEPTOE & JOHNSON, OF COUNSEL

[Having been first duly sworn by Secretary Mason.]

MR. CUNNINGHAM: Mr. Chairman and members of the Commission:

My name is Richard Cunningham. I'm with the firm of Steptoe & Johnson, counsel to the petitioning copper group.

I would like to ask as a preliminary matter that the statements of the witnesses, which have been given to the Commissioners already, be admitted into evidence. They appear in this book. I would make this motion with a warning: This book is so crammed with important information that every time you open it it spews out little bits of white paper all over your clothes. So a bit of caution is in order.

CHAIRMAN ECKES: We will enter that as what?

SECRETARY MASON: That is Exhibit No. 2, Mr. Chairman.

(The document referred to

has no relevance to this case. There are several ways in which the U.S. industry's costs could have relevance.

What you have here is an industry which between 1979 and 1983, the period since the last investigation, which coincidentally coincides with the five-year period that you normally investigate, has seen its economic performance worsen dramatically. And you're interested in what is the cause of that worsening of its economic performance, is it imports or is it something else?

If you were to find that increases during that period in the U.S. industry's costs, particularly where those costs are imposed on them from the outside -- say environmental costs have increased in that period -- you might well find that that increase in the cost is a cause to be weighed against imports.

Now, fortunately for us, that is not the case here. As Mr. Hunt will testify in great detail and as Mr. Nehmer will testify, overall U.S. industry costs have in fact been reduced during this period. The U.S. industry is modernizing, has been modernizing, and has become more efficient during the period.

Specific types of costs that you might look to -- environmental costs I note particularly -- are a

lesser factor for the industry now than they were in the previous period that you investigated. Increases in these costs then can't be a cause of injury to the U.S. industry.

Now, costs are also relevant in another way, and I submit this is the most important relevance of costs in this case, and that is they are relevant to the adjustment issue. If you were to conclude, as Codelco and everyone seated to my right would have you conclude, that U.S. costs are permanently and unalterably non-competitive, I might be asking the question whether it's you who should conclude that the case ought not to be one in which relief is granted or the President. But certainly I would have a hard time arguing for relief in an escape clause case where an industry could not make cost reductions that would make it competitive.

But that issue is the one single issue on which I think you will find our testimony today most impressive, and I want you to listen particularly to Mr. Borne of Duval. I want you to listen particularly to Mr. Hunt.

And you will see that if relief is granted in this case enabling the U.S. industry to pursue the programs which it has already commenced and to survive long enough to gain the benefit of conditions in the

world market, most notably ore grades which are now changing favorably to the U.S. industry relative to their foreign competition, you will see that by the end of a five-year period of relief the United States industry has the potential to become one of the lower cost copper producers in the world.

That frankly is what makes me excited about this case. This case presents a potential for the United States to take a major industry, give it a breathing space, and have it emerge as a viable, vigorous competitor in the U.S. market and in world markets. That is what the escape clause is supposed to accomplish and that is the opportunity we have here.

Now, I want to say a brief word about what must be one of the more curious arguments I have seen presented in a Section 201 case. I refer to the argument that what has caused the imports, it is contended, is that every three years -- 1977, 1980, 1983 -- customers anticipate that a strike is going to come and so they go out and they buy up imports as a safeguard against the possible shortage of supply caused by a domestic producers strike.

Now, parenthetically, I ought to note at the outset that this is an argument that I think really isn't a relevant issue. It goes to why the imports come

for the EPA-related costs.

Now, isn't 10.5 cents more than twice 5 cents?

MR. CUNNINGHAM: Of course, but it's not the relevant figure.

COMMISSIONER STERN: Well, that's the reason I'm pushing you on what that five cents means.

MR. CUNNINGHAM: No, the 10.5 cents is not the relevant figure, and the reason for that is this --

COMMISSIONER STERN: That's the only one you've put in here.

MR. CUNNINGHAM: No.

COMMISSIONER STERN: Give me another one.

MR. CUNNINGHAM: There is no injury to the U.S. industry during this period from environmental costs. What you have is a situation where the health of the U.S. industry deteriorated dramatically during the period '79 to the present. What caused that deterioration? That is the question for you to answer as a Commission.

If the industry was running along at a cost, an environmental cost before that period and at the time when it was operating healthily of higher than 10.5 cents, which it was when it was healthy, and then it became unhealthy when environmental costs fell,

Smelter Crisis Education Project
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THE SMELTER TRIANGLE: AN OVERVIEW OF U.S.-MEXICO NEGOTIATIONS

TESTIMONY OF RICHARD KAMP, SMELTER CRISIS EDUCATION PROJECT

AUGUST 12, 1985
DENVER, COLORADO

BEFORE THE UNITED STATES SENATE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

"The Mexican and United States National Coordinators agreed that the control of the Douglas and the Nacozari smelters should be linked so that interim and permanent controls will be applied."

US-Mexico Joint Communique
Border Environmental Meeting
July 18, 1985

"If your Congressional representatives want us to do something about Nacozari pollution before 1988, they'd better be willing to control sulfur emissions from the Douglas smelter."

Clifford Metzner
U.S. State Department, Health and
Environment Officer
Phone conversation: July 24, 1985

"We have no priorities, only different pressures."

Official from Mexican Secretariat of
Urban Development and Ecology, October, 1984

This testimony is written to familiarize the Senate with the state of negotiations on the international US-Mexico copper smelter triangle, and to offer suggestions as to the role of the Senate in this precedent-setting situation.

Mr. Hart and members of the Committee, thank you for the opportunity to testify on the international "smelter triangle" and the negotiations surrounding it. The Smelter Crisis Education Project (SCEP) was established in 1983 to be a binational grass roots catalyst for an accord to control pollution from the 3 copper smelters at Douglas, Ariz., Nacozari, Sonora, and Cananea, Sonora. The smelters are located within 56 miles of each other, near the Arizona-Sonora border.

My focus is more on Douglas and Nacozari--the 2 largest smelters, and the greatest threat to southwest and Rocky Mountain air quality. This focus has been reflected in negotiations between the U.S. and Mexico.

THE SMELTERS

If Nacozari achieves normal production level by early 1986, and Douglas and Cananea maintain their normal levels, the 3 will emit around 2700 tons per day of SO2. This is about 27 times the current SO2 output of the 4 Corners Power Plant, 60 times the output of a large, controlled, coal-fired power plant, and more than the largest source of sulfur in North America--the Sudbury--Falconbridge nickel smelting complex. Environmental and health impacts from SO2 and hazardous air pollutants will be frightening in the immediate area around the smelters--with an enormous mix of sulfates and particulates aggravating bronchial and immune disease problems.

Long-range travel of sulfur pollution from the Arizona smelter belt has been addressed by 4 studies in the past 2 years, with growing evidence that the sulfur depositions will acidifysensitive high mountain lakes if not curtailed.

My family--along with many others-intends to leave the area until controls are imposed at Douglas and Nacozari , should the present scenario of uncontrolled pollution from 1986-88 become a reality.

Douglas

The Phelps Dodge Douglas smelter is located on the Mexican border--with no ambient monitoring over 170 degrees of the surrounding area--in the S.E. corner of Arizona. It is the largest industrial, non-utility, SO2 polluter in the U.S; allowed, under Arizona interim emissions limits, 1122 tons per day of SO2. In 1984, it produced 53% of all the total SO2 emissions in Arizona--home of 7 smelters. It has operated in its present form--without controls except for a small acid plant removed in the 1940s--since 1913.

PD has applied, under Section 119 of the Clean Air Act, for a NSO(Non-ferrous Smelter Order) exemption from pollution control until January 1, 1988. Legal loopholes could extend that date to 1989, if the NSO is granted. If the NSO is denied, the smelter will have to be in full compliance with EPA approved State Implementation Plan (SIP)--188 TPD of SO2--by January 14, 1986.

Even with NSO denial, the legal process of enforcing that compliance could stretch out for years.

PD has said many times that they will close Douglas when forced to install control technology because of the age and condition of the plant. The company built and opened the Hidalgo smelter in southwestern New Mexico in 1976 to replace Douglas. In their 1984 Annual Report, Phelps Dodge stated that the company could profitably sell or toll smelt any concentrates that could not be processed at other PD smelters due to a pre-1988 loss of production capacity at Douglas for environmental regulatory reasons.

The smelter employs between 245-350 Douglas area residents. The Job Training Partnership Administration recently reported that considerable job training and educational funding has been funneled into Douglas in anticipation of a possible 1986, and a definite 12/31/87 shut down.

The JTPA added that new industry and a prison have located in Douglas in the past months,expecting the closure, and that a minimum of 750 new jobs are expected by mid-1986. 450-500 will be at salaries commensurate with the smelter. The county assessor estimates that at worst case, smelter closure could reduce the school budget by about 1%, and raise county taxes by $5 per $50,000 house.

Few believe even this much impact could come from closure. To quote the JTPA report, "Douglas has a bright future." Of course, no one can predict the future.

The smelter has impacted county agriculture for over 80 years--and for the past 50 years, Cochise County has been the home of "smoke easement" agreements that the corporation purchased from landowners. These easements removed the right of PD to be sued for crop damage, or damage to health and welfare. Sold at prices ranging from $5-$2000, they became a part of the title to land--to the shock and dismay of later purchasers--and they extend as far as 40 miles from the smelter.

Evidence submitted to the State by the Environmental Defense Fund shows that the smelter operated at levels sufficient to cause aggravation to asthmatics--

on 74 days during 1984--a year in which they recorded 19 ambient SO2 exceedances on U.S. soil. Background ambient arsenic levels in Douglas were .027-.037 mg/u^3 average annual mean during 1983-84. This was 27-37 times the levels recorded at monitors located at Montezumas Castle, a "control" area, north of Phoenix.

The EPA has estimated that as many as 3.7 per 1000 excess deaths may occur near the smelter, from arsenic alone. At least 100,000 live on both sides of the border within 3 miles of the stack.

--Douglas and the copper industry

The U.S. copper industry has invested hundreds of millions of dollars in improving efficiency and installing environmental controls. It has demonstrated flexibility in hard times--aggravated by foreign, subsidized, environmentally cheap-to-operate foreign smelters.

The Douglas smelter is much like one of these foreign US or State owned "third world" smelters in Chile or Peru. Exempted from installing controls, thus far, it can smelt cheaply and flexibly--if not efficiently--without environmental control maintenance or installation costs. There is no worry about efficiently amortizing costs because the plant was paid for decades ago. It operates on totally flat terrain with reasonably tall stacks and no responsibility for controlling the enormous volume of pollution flowing south to Mexico.

As world copper market conditions remain poor, some other industry representatives find it difficult to defend the right of Douglas to continue operating without controls.

Mexicana de Cobre Nacozari smelter

The Nacozari smelter is scheduled to be in operation by January, 1986. Mexicana de Cobre has announced their "commitment" to install a sulfuric acid plant by January, 1988. In the interim period, they will emit up to 1370 tons per day of SO2 from a 932 foot stack. The plume will be very concentrated in SO2 as it leaves the stack--approx. 15% by volume according to the EPA, compared to 1% at the Douglas smelter.

The tall stack will carry the concentrated plume away from the smelter site, but nocturnal flow will very often take it into the townsite of Nacozari, located in a canyon, 10 miles south. No estimates have been made of the impacts of prolonged settling of smoke in the area, but "reasonable wind patterns"

are likely to cause 90% levels at higher terrain of 13 times the ambient 3 hour United States standards. * The health threat in the surrounding area is definitely real.

EPA rough modeling shows that SO2 standards in the Douglas area will probably not be violated--but that background levels could rise to 23% of a violation from the Nacozari plume, raising the probability of violations at the Douglas smelter.

The Nacozari mining complex is owned 56% by private interests--including about 5% ownership by ASARCO thru a holding company. 44% is state-owned and overseen by the ministry for mining and parastate industrial development, SEMIP.

Decisions on developmental questions--including environmental ones--at Nacozari are made by SEMIP, in conjunction with various other ministries including SEDUE (Secretariat for Urban Developmental and Ecology), the ministry mandated to control pollution. This was made quite evident at the July 18 meeting in which SEDUE stated that they were not yet empowered to make decisions about Nacozari pollution control because they could not regulate sulfur emissions.

The smelter has utilized funding from private U.S. and Canadian banks, the Japanese export-import bank, and allegedly, in 1984, from the World Bank (Mexicana de Cobre Director Jorge Larrea stated this in late, 1984). The smelter was largely built by the giant U.S. contractor, Fluor Corporation, and Mitsui of Japan has overseen some construction.

The labor force will be Mexican, and the ex-Phelps Dodge Superintendent of the Hidalgo smelter will be overseeing the opening--most probably without controls--of the Nacozari smelter in early, 1986.

Compania Minera de Cananea smelter

This plant was owned for years by Anaconda, and it is now a parastate operation. It has operated with little change since 1891. 1982 rough emissions estimates were about 340 TPD of SO2 from very low stacks--approx. 1/3 the level of Douglas emissions. Cananea is 50 miles southwest of Douglas and 20 miles south of the border.

*New Mexico Bureau of Air Quality, letter to SCEP, July 17, 1985

The Cananea smelter received intense attentionin 1982-83, when it appeared that it would triple production, with no pollution controls, on the basis of IFC World Bank funding. The loan was not given, and , on July 18, 1985, the Mexican government announced that the smelter would not expand capacity before permanent controls are installed.

Expansion plans are on hold for the smelter, and the mine and concentrator are enlarging, but well behind schedule, probably not completed until 1987.

The mine is the scene of chronic pollution of 2 nearby rivers--with one in Mexico suffering, ironically, as a result of U.S. pressure to stop polluting another that flows north into Arizona.

Both rivers are now polluted, and concerns are being raised also, concerning greatly increased groundwater usage by the mine.

THE NEGOTIATING PROCESS

has been carried out under the August 14, 1983, Executive Agreement for US-Mexico "Cooperation in the Border Region"; signed La Paz, Baja California. The La Paz agreement designated that there would be high-level discussions on US-Mexico border environmental problems. The U.S. is represented by EPA, under the guidance of the State Department, and Mexico, by SEDUE, the Secretary of Urban Development and Ecology--under the authority of SRE, the Foreign Ministry.. Two "National Coordinators" were named: Fitzhugh Green, EPA assistant administrator for International Affairs, and Alicia Barcena Ibarra, sub-minister of SEDUE-Ecology.

Provisions were made, under the agreement, to develop individual annexes for specific problems. According to the State Department legal affairs office, the annexes can be imbued with strong legal authority sufficient to regulate pollution in the United States--following State Department consultation with those members of the Senate who would be affected by such legislation. The annexes could also serve as guidelines for ammendments to the Clean Air Act, under Section 115--transboundary air pollution.

In 1984, the EPA provided initial funding for a "smelter conference" jointly sponsored by the University of Arizona and the Autonomous University of Mexico. The conference, scheduled for September 26-27, 1985, will be a forum for binational problem solving.

Technical working groups were established, under the La Paz agreement, to meet to discuss air, water, and toxic hazards. Informal talks relating to the smelter triangle began in July, 1984. Official working group meetings took place in November, February 85, May, and July 85.

The February working group meeting issued joint recommendations to develop emissions standards for the Mexican smelters, a U.S. commitment to control or close Douglas by January 1, 1988, and a Mexican intent to "encourage" controls at Nacoza i and Cananea by the same date.

These recommendations resulted in a public fear that Mexico would operate Nacozari without controls, prior to 1988, in simultaneous conjunction with the Douglas smelter. Letters from western Senators and Representatives asked the State Department and the EPA to ensure that Nacozari would not open prior to installation of controls. A follow up letter asked President Reagan to intervene with President de la Madrid to strengthen the negotiations. Neither letter directly addressed the issue of U.S. pollution at Douglas.

Arizona Governor Babbitt announced in February, that he would utilize the state operating permit for the Douglas smelter to control its emissions and bring it into compliance, in part to gain a promise of no operation of the Nacozari smelter without controls. The state Arizona Health Services Director was asked by the mayors of surrounding cities near Douglas, and heads of Chambers of Commerce to deny the smelter an operating permit.

In August, the state granted the smelter a permit--but included a provision that requires the smelter to submit a plan stating how it will be in final compliance with the SIP (reduced to 188 TPD of SO2) by January 14, 1986. Whether the permit will be enforced is an unanswered question.

On June 27 the State Department--and on July 9, Governor Babbitt--asked the EPA to deny the Douglas smelter the NSO exemption that PD had applied for, on grounds of providing flexibility for negotiations with Mexico on Nacozari.

Denying the NSO would require the smelter--as described in its current permit--to be controlled for sulfur by January 14, 1986.

The EPA decision on the NSO is pending, with an agency draft decision probable by September or October, followed by a public comment period, and then a final decision. The process is likely to string out past January 14, 1986--by which time it is quite possible that Nacozari will be operating.

On July 18, 1985, the National Coordinators issued a "joint communique" that largely confirmed the February recommendations of the working group.

The communique did not constitute any final agreement, rather it was a statement of intent that:

--linked permanent and interim pollution controls at Douglas and Nacozari

--stated that Mexico could only "take note" of the U.S. request to not allow the Nacozari smelter to open prior to installation of controls because SEDUE lacked the authority to control sulfur---and because the company needed to operate for 18-24 months to generate capital to build an acid plant to capture sulfur-that would be installed in January 1988.

--further stated that the commitment to install the acid plant was by Mexicana de Cobre

--Mexico stated that Cananea wouldn't expand without controls

--Final sulfur emissions limits would be developed by SEDUE for Nacozari and Cananea prior to the end of 1985.

--the U.S. gave a firm commitment that Douglas would comply with the"provisions of the Clean Air Act as soon as possible, but no later than January 2, 1988". (a somewhat vague commitment, not specifiying final compliance).

The portions of the Joint Communique applicable to the smelters are attached as an appendix to this testimony.

* *

It is not easy to describe the reaction to the communique. Many were surprised that Mexico had agreed to anything formally, if not bindingly. Most political representatives were not really clear as to what it all meant. And few of those in public office who fretted at the possibility, in February, that Douglas and Nacozari could be operating at high capacity from 1986-88--seemed to sustain that worry when it appeared as a reality in July.

Yet, the negotiations are not over. It is encouraging that Nacozari should have an acid plant in place by 1988. But we remain in suspense about Douglas and its NSO. And the clearest statement in that joint communique was the linking of control of Douglas and Nacozari. Cliff Metzner of the State Department added, after the meeting: "If everyone is happy, we are happy. If you want us to negotiate for interim controls at Nacozari, then do something about Douglas."

NACOZARI INTERIM AND PERMANENT CONTROLS: CONTINUING THE NEGOTIATIONS

On July 18, when SEDUE officials provided a commitment from Mexicana de Cobre that an acid plant would be in place at Nacozari by January, 1988, a period of mysterious speculation ended.

The question of how to provide "incentives" for control dissolved--altho many other questions remain.

How large a plant will it be (how much sulfur captured?)? When will the Mexican government make the commitment, and not industry? Will it produce only sulfuric acid, or other byproducts? What happens between now and January, 1988, as far as environmental protection is concerned? How does the agreement become binding and enforced? What can be done to reduce the emissions from Nacozari, prior to January, 1988? Is it still possible to ask Mexico not to operate the smelter prior to installing controls?

There are 2 avenues of negotiation open with Mexico under the La Paz agreement, and there is a third --more subtle-- way that Mexico may choose to protect its own environment.

The first route is the environmental negotiations--represented by EPA and SEDUE. Since Douglas and Nacozari are now linked in interim and permanent control, the EPA can guarantee a reduction in emissions at Douglas. Legally, this could occur by bringing Douglas into final compliance with the Arizona State Implementation Plan thru denial of the NSO (Non Ferrous Smelter Order). It could also be possible, but legally trickier, to establish a greatly reduced emissions limit at Douglas as part of a NSO, if the EPA were to grant one. Douglas operated on only one furnace part of 1982-83, under 400 TPD of SO

Controlling sulfur emissions thru either route could serve as grounds to ask Mexico to impose an emissions limit on Nacozari for sulfur to match the U.S. action at Douglas. Unfortunately, the Mexican government--represented by its environmental ministry, SEDUE--can only "take note", as they did in San Diego, until they promulgate into law, regulations concerning sulfur emissions in Mexico.

They intend to do this by December, 1985. It is doubtful that the NSO process will be completed before that time, anyway.

Avenue 2 belongs to the State Department and it addresses the need to operate

*Douglas current emissions limit: 1122 TPD, Nacozari est. 1370 TPD

the Nacozari smelter from 1986-88 uncontrolled to generate $ to pay for an acid plant. The smelter would cutback production during times of meteorological inversions--which would not necessarily reduce total tonnage of pollution, and would have relatively little relation to meteorological conditions in the U.S.

The question of loans to build control technology has not arisen--and may never arise. It is secondary to the issue of how to generate capital to pay for sulfur controls, without increasing debt at a time of increasing national debt and a rapidly devaluaing peso.

Mexicana de Cobre may utilize pesos to contract to a Mexican company--probably IVESA--to build an acid plant. They could also utilize U.S. or Japanese capital to hire a foreign contractor to install controls. Right now, they are on the first course--tho it is hard to understand how they could be signing a contract to build an acid plant when the capacity required to capture sulfur has not been agreed upon by the U.S. and Mexico.

The State Department--with the encouragement of Congress--can be utilizing its resources to establish trade agreements or commodity exchanges that provide Mexico with the capital to build controls. Providing, of course, that the agreements are created contingent upon the smelter agreeing not to operate until the controls are in place.

The granting of GATT-equivalent trade status to Mexico has made it far more advantageous to pursue this course. Certainly, the U.S. Trade Center at the U.S. embassy in Mexico City is in a position to discuss potentially workable trade agreements with the Mexican Foreign Ministry (SRE).
The Nacozari mining complex is 44% owned by the government and that interest is under the jurisdiction of SEMIP--the parastate agency that also oversees PEMEX--a government agreement could expedite capital transfer for construction of controls at Nacozari.

The Nacozari mine is now operating at high capacity and selling concentrates to a depressed world market where foreign smelting is cheap. Japan smelts almost at cost, just to have the copper. It will increase costs, somewhat, to retrofit the Nacozari smelter with controls after it has been operating. It would appear that waiting 18-24 months to operate the smelter would not be devastating to Mexicana de Cobre.

However, they can generate some extra capital by selling the copper--and unless offered another direct means of generating money, the company will want

to operate the smelter at its lowest cost--without pollution control. The U.S. could also purchase pollution by-products from the smelter--as part of an agreement to delay operation until controls are installed.

There is a third reason for Mexico to choose to encourage sulfur control at Nacozari prior to 1988. It would require an analysis, in Mexico, of the negative impacts of uncontrolled smelter pollution--especially combined with the Douglas plume--on Sonoran territory.

Such impacts would be defined, in Mexico, as "social" ones. Altho there are no existing sulfur regulations, hazards to the general welfare of society could be "regulated" by virtue of popular and governmental concern.

This would involve establishing degradation of health, agriculture, or some other aspect of the economy by Nacozari smelter pollution.

Primarily sulfates and particulates will be transported to the U.S. from an uncontrolled Nacozari. But the rough estimates of SO2 concentrations in some areas around the smelter already indicate a probable health danger during "reasonable" meteorological conditions.

Prolonged inversions--fumigation of the smoke--could create as yet undefined health crises that need more definition. This type of information, if impartial and based on legitimate dispersion models, could have an influence on Mexican decision making. SO2 also kills crops, and models can be created to show the impact on Sonoran crops of Nacozari, and joint Nacozari-Douglas, fumigation of agriculture in the irrigated fields north of Nacozari.

SCEP hopes to help coordinate this information for examination by Mexican ecologists.

The long-range goal of an international accord will be to ensure that the agreement remains operative. This will require an international agency--with teeth--that is similar in function to an International Boundary and Water Commission of the Air.

The current "Air Working Group--Smelter Task Force" may be the basis for such an international agency. Congress must ensure that such an agency is recognized as the administrator of US-Mexico air quality agreements.

MEXICAN ENVIRONMENTAL CONTROLS: THEY MUST BE ECONOMIC

I am attaching 2 pages of my June 28 testimony before the House as an appendix that discusses control strategies at Nacozari that could be economic. Since the current plan seems to be a simple acid plant, it is probable that the Mexican government is simply looking at the lowest cost investment option. And since they appear to have made their decision, it is a waste of space to discuss non-immediate concerns.

However, given the terribly tough economic shape of Mexico, the investment in environmental controls at Nacozari will constitute a dramatic precedent. If it is seen as a financial fiasco, it will be neither maintained nor encourage further investment in ecological control outside the narrow 63 mile band south of the border that is within the bounds of the 1983 La Paz Agreement.

Within that zone, one might expect by the 1990's, coal development, power plants, more mining, increased urban pollution, and border industrial development. Nacozari will be the "border" example--success or failure--in pollution control investment.

Hopefully, development of pollution controls on industry within the 63 miles near the border will not result in dirty industry locating 64 miles south of the boundary. The Nacozari smelter is 56 miles"down"-barely in there.

CONGRESSIONAL OPTIONS: CREATING LONG-TERM INTERNATIONAL SMELTER POLLUTION LEGISLATION

It has become obvious that the smelter triangle requires an almost daily reassessment of complex issues and strategies. It is difficult to ask the United States Senate to be flexible and openminded--and to simultaneously present guidelines.

The negotiations on the smelter triangle have presented us with some ground rules that can and must be tightened to protect the short and long term air quality of the U.S. southwest and Rocky Mountain west.

The following page outlines Congressional options to strengthen negotiations, and to provide interim and long-range protection from smelter pollution.

SCEP offers them in conjunction with Environmental Defense Fund and Southwest Environmental Service testimony on broader Western Acid Rain and southwestern smelter control.

Environmental Legislation

Congressional support for an agreement to control pollution from all 3 smelters has become a critical input for EPA and State Dept. negotiators. Environmental legislation relates to the technical solutions and is separate from any economic options listed here--altho they could and should be integrated in the negotiating process.

1. Congress should enter into discussions with the EPA and the State Dept. to develop ammendments to Section 115 of the Clean Air Act related to the smelter triangle. These should reflect negotiated control objectives carried out under the La Paz Agreement--and will serve to strengthen any annex developed under the agreement. Including:

A. EPA mandated final compliance with the State Implementation Plan (SIP) for the Douglas smelter, as soon as possible, and no later than January 1, 1988.

B. Mexico will apply continuous controls, and operate them at all times, on the Nacozari smelter by January 1, 1988. The controls will capture sulfur and particulates at the internationally agreed upon final emissions level to be established by December 31, 1985. (Congress should express concern that this level equals U.S. performance standards)

C. Interim levels of sulfur emissions from the Douglas and Nacozari smelters--prior to Jan. 1, 1988--should be limited to 400 tons per day SO2 each. This reflects a level of atmospheric loading no greater than present levels. This interim level is not meant to preclude the Douglas smelter entering into final compliance through EPA or State of Arizona or other legal actions. It constitutes a minimal interim level of protection of health and welfare in the areas surrounding the 2 smelters.

D. The Cananea smelter will not expand beyond present capacity without the installation of permanent sulfur control technology.

E. The expansion of the joint U.S.-Mexico "Arizona-Sonora Smelter task force"/ "Air Working Group" to form a "duly constituted international agency.", as referred to in Section 115 of the Clean Air Act--empowered tobear responsibility for implementing, maintaining, and enforcing an international control agreement.

2. Congress should set a final expiration date for all NSOs for copper smelters of January 1, 1988. This closes the legal loophole for Douglas operation beyond that date, and limits the NSO for any smelter to the period of time established by Congress in 1977.

It also ensures that the San Manuel copper smelter--second largest industrial sulfur emitter in the United States--will proceed with its plan for meeting the final EPA approved SIP by January 1, 1988, thereby remaining an ongoing source of U.S. copper and employment.

Economic legislation

1. The House and Senate should jointly request the State Department to enter into binational negotiations, under the La Paz agreement, to develop economic alternatives to operating the Nacozari smelter without controls, prior to 1988. The U.S. Trade Center is a possible clearinghouse for U.S. input into this binational process.

Binational economic negotiations are clear companions to reducing Douglas emission limits to obtain a "linked" reduction at Nacozari.

2. If negotiations lead to a potential loan from an agency such as the Interamerican Development Bank, Congres should ensure that it is clearly defined as a loan for control technology, and not one to support foreign copper production.

FROM: JOINT COMMUNIQUE--US/MEXICO
BORDER ENVIRONMENTAL NEGOTIATIONS
SMELTER RELATED: PP: 2-4
July 18, 1985

The delegations stated that through this presidential agreement a positive dialogue without precedent has been established, which allows a precise and full collaboration through specific actions for the solution of quality of life problems for the border populations.

The U.S. delegation complimented Mexico for the important initiative in constructing a large-scale treatment system for municipal wastewater in Tijuana.

The goal of the Air Quality Working Group is to identify and address present or potential air quality problems of mutual concern along the U.S.-Mexican border. Based on our present knowledge of the air pollution problems, the following three geographic areas will be initially addressed: El Paso-Ciudad Juarez, Arizona-Sonora Smelters, and San Diego-Tijuana.

The Air Quality Working Group will coordinate air pollution control training programs to help address the pollution problems. The first binational training course was held in El Paso June 24-28, 1985. Local task forces have been formed to address the geographical problems. The El Paso-Ciudad Juarez task force and the San Diego-Tijuana task force will be developing ambient air quality data to define the extent and magnitude of the problem, and will be developing emission inventory information to identify the source of the problem. This will lead to recommendations to address the air quality problem in these two geographic areas. The Arizona-Sonora

Smelter task force is addressing the problem of uncontrolled emissions from the Cananea, Nacozari and Douglas smelters.

With regard to the Cananea smelter, the Mexican Government has declared that the smelter will not be allowed to expand its capacity without the prior application of permanent controls, such as an acid plant for the control of sulfur oxides.

The Mexican and United States National Coordinators agreed that the control of the Douglas and the Nacozari smelters should be linked so that interim and permanent controls will be applied.

With regard to the Nacozari smelter, the Mexican Government has obtained a firm commitment from the industry that an acid plant will be in operation at the smelter by January 1988.

During the negotiations, the U.S. requested that the Nacozari smelter not start up until permanent emission controls are applied. While the Mexican Government officials took note of the U.S. requests, they informed the U.S. that the necessary legal instruments for control of sulfur emissions are still being completed. Also, the Mexican officials informed the U.S. that the initial operation of the smelter during the 18 to 24 months - the minimum period required to construct the acid plant - is necessary to generate revenue to help in its financing. The Mexican officials noted that Mexicana de Cobre originally intended that the acid plant be completed in mid-1988, but because of Mexico's concern the completion date has been accelerated to January 1988.

With regard to the Douglas smelter, the U.S. Government gave a firm commitment that the smelter will comply with the provisions of the Clean Air Act as soon as possible but no later than January 2, 1988.

Prior to the application of permanent controls at Douglas and Nacozari, interim measures will be applied at both smelters to monitor and reduce the impact of the emissions. By the end of this year, both governments will require detailed programs by these plants for application of permanent controls.

The U.S.-Mexico Water Quality Working Group was established to evaluate data and alternatives related to resolving serious border sanitation problems with priority attention given to Tijuana-San Diego, and Mexicali-Calexico, and to make proposals for formal agreement within the IBWC. Mexican concerns that some waste dischargers in Southern California, which are releasing heavy metals, may contribute to the contamination of shellfish off the Mexican Pacific coast.

During its first year of operation, the Working Group met three times to exchange data and address priority problems. Specifically, the group contributed to development of the program that has been approved for resolving the Tijuana wastewater problem. Recommendations were made for correcting municipal and industrial waste discharge problems in Mexicali which the Government of Mexico is acting upon and for correcting a trans-boundary water quality problem affecting Naco, Sonora, and

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July 16, 1985

The Honorable Dennis DeConcini
328 Hart Senate Office Bldg.
Washington, D.C. 20510

Dear Senator DeConcini:

We have been asked to respond as to the contingency plans in place to contend with a Phelps Dodge layoff at the Douglas Smelter facility in January of 1986. This office is engaged in employment and training programs for Cochise County under the Job Training Partnership Act (JTPA).

Most of our activities are related to assisting economically disadvantaged people in this area to achieve full-time employment through the JTPA Title Two Program. Through the Title Two Program employers are the training sites and in Douglas this program has place over 130 people in new full-time jobs and has placed over 250 youth in temporary and permanent part-time jobs. This represents almost a half million dollars that has been put on the Douglas economy directly through this program.

The JTPA Title Three program for Dislocated Workers is headquartered in Tucson at the Regional Reemployment Center. Approximately $150,000 is available through this program to serve dislocated miners or smelter workers at Douglas facility. Of the approximately 350 workers at this smelter, 100 to 150 are expected to take advantage to the relocation provisions which pay some expenses and retraining costs. Another 50 to 60 will retire with pensions. The remainder will be eligible for services available locally.

The greatest number of JTPA placements on unsubsidized jobs has been in the Douglas labor market, despite a dramatic shift of the economic base of the area from one dependent upon the retail trade of shoppers from Mexico and the garment manufacturing business. Douglas is expanding its labor force to the point where jobs are being advertised out of state. The Cochise Private Industry Council, Inc. is directly involved is training local residents to fill available positions. The main areas of expansion are with the Arizona Department of Corrections (DOC) new facilities; electronic assembly and warehousing, construction and related business; and health care. We expect this to total about 750 new jobs in the next 12 months, that

we can identify now.

Institution operations (DOC) and the $60 million HUD grant which the city of Douglas has received represent the creation of hundreds of new jobs which are occupationally compatible with the displacements which would occur with a smelter closure.

The multiplier effect of this much new income will have a long lasting impact on the future stability of the area, and therefore we are actively assisting local business with their expansion plans.

The picture in the Douglas area is bright and despite the uneasiness of change the economy is developing strongly. To ease the shut down impact we would urge that efforts in economic development areas be the main focus.

Sincerely yours,

Bruce G. Carey
Operations Manager

BGC:sab

APPENDIX: EXCERPT FROM SCEP TESTIMONY BEFORE HOUSE SUBCOMMITTEE ON HEALTH AND ENVIRONMENT, June 28, 1985--background material on economic options for Nacozari smelter.

--Developing Positive Economic Incentives

It will be far cheaper and more efficient to build controls into the Nacozari Smelter, than to retrofit the smelter later after it opens. In fact, its technology is optimal for capturing sulfuric acid from the smoke due to the high SO2 concentrations emitted by the furnace and converter. Second, the Nacozari, LaCaridad Mining Complex, has produced and sold copper concentrates on the world market for 5 years at high capacity--without a smelter. It can continue to do so until such time that the smelter is controlled.

Clearly, the ministries that have overseen co-investment with Mexicana de Cobre in the mine want to produce the most sophisticated and finished copper products possible--with investment in devalued pesos rather than dollars. In addition to the smelter, there will be a molybdenum plant, and in Empalme, Sonora, an electrolytic refinery to produce pure copper products--as well as a wire mill.

These ministries--SEMIP, the parastate agency which also regulates PEMEX; Hacienda, which controls domestic finances; NAFINSA, the national trust; will make the ultimate decisions on control technology at Nacozari, in consultation with SRE, the Foreign Ministry. They will transmit their concerns to the struggling sub-ministry of SEDUE-ECOLOGY--SEDUE being the agency representing Mexico in negotiations on border environmental issues.

In the United States, the Nacozari issue is often discussed in terms of competitiveness with a U.S. copper industry which has invested huge sums of money in pollution control--and faces unfair competition from foreign producers who operate without those costs. Mexico--even with the Nacozari Smelter, will not be a large exporter of copper, but the argument is true: Nacozari will have more competitive costs with U.S. copper producers, as well as far less impact on the U.S. environment--if it has pollution controls.

Conversely, the smelter has to be as economic to operate as possible, with controls installed, or the controls will be by-passed, or insufficiently maintained, which will be extremely dangerous to human health--both in, and off the smelter grounds, as well as a waste of money invested in them.

Smelter control technology, unlike power plant scrubbers, is utilized to produce a marketable product--essentially, the smoke is mined for sulfur. In the U.S., it is generally sulfuric acid, although in Canada

it is often elemental sulfur, and in Japan, where resources are scarce, the controls are more sophisticated and produce by-products such as plasterboard and fertilizer. Mexico has little capital, but relies on exploitation of resources to keep its economy alive. The state involvement in the Nacozari project means that joint investment in mining and marketing, both copper and its pollution by-products, could be expedited by the government--whether the by-products were produced by Mexicana de Cobre, a state-run plant, or a joint Mexico-Foreign, or wholly foreign investment. Such pollution by-product manufacturing would add employment--as well as investment costs.

Over the past ten years, the Japanese have increasingly utilized a limestone tail gas scrubbing technology in conjunction with a sulfuric acid plant to produce a residue that they dry and market--often in the form of plasterboard. The lime that Japan imports, is a natural resource near the Nacozari smelter, some owned by U.S. interests, and plasterboard is a product that Mexico already exports to the U.S. in small quantities. U.S. lime products manufacturers, also import lime from Mexican plants along the border. Furthermore, the old Phelps Dodge-built railroad from Nacozari to the Douglas smelter, is still in operation, allowing for cheap and quick transportation to the United States. Douglas is a logical port of entry and potential warehouse for his product, used in vast quantity by the western tract house building industry.

Other possible by-products, are ammonium phosphate and sulfate fertilizer, which would require the importation of phosphate rock from other areas of Mexico, or direct marketing of sulfuric acid or elemental sulfur. The market for both of the latter products has improved in recent years--particularly for elemental sulfur--and Mexico is currently importing sulfuric acid from the U.S. copper industry.

A number one priority for Mexico is therefore to ensure that they can economically develop and market the by-products. Certainly unskilled labor costs are low in Mexico. It has been suggested that the U.S. could offer economic incentives for U.S. industry to build and maintain a U.S. owned "by-products factory"--and take over responsibility for both maintaining the pollution control, and selling the by-products. This could also be a joint Mexico-U.S. venture, or it could end up involving foreign investment such as Japan's.

The latter is realistic because whether or not Japan is involved in the Nacozari investment, they do want the copper, have the expertise, and furthermore the Marubeni Corp. has already entered into a barter agreement to build the Empalme refinery for Mexicana de Cobre in exchange for copper.

The U.S. could choose to agree to provide a market for the Nacozari pollution by-products under a Department of Commerce trade agreement. It is also possible that trade agreements could be designed that ensure a capital flow to Mexico, contingent upon Mexico agreeing to borrow money to install the controls at Nacozari.

The less directly connected to the copper by-products production, the more difficult such an agreement might be to arrange.

The Congressional Research Service has suggested that U.S.-Mexico barter could be a means of providing pollution control equipment for the smelter--fluor spar being a strategic stockpile mineral that the U.S. needs, and Mexico exports. The fluorspar would be traded to the U.S., and we would purchase the pollution control equipment for Nacozari in return.

Statement of W Mitchell

representing the

National Parks and Conservation Association

before the

Environment and Public Works Committee

United States Senate

Denver, Colorado

July 12, 1985

Mr. Chairman, my name is W Mitchell. I am Vice-Chairman of the Board of Trustees of the National Parks and Conservation Association and appear today on their behalf. I want to thank you for bringing the Committee to hear, first hand, from many knowledgeable Governors, scientists and citizens, our shared concerns about the future for the quality of air and the quality of life in the West.

The National Parks and Conservation Association is the oldest national conservation organization dedicated exclusively to the health and future of the National Park System. For 65 years, NPCA has served as a citizens' voice for the national parks.

In the West we are fortunate to have the largest concentration of

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nationally treasured lands in the United States. In the Four Corners states and within the "Golden Circle" of the Colorado Plateau are located one fifth of the park areas found in the lower forty-eight states. These areas are priceless for their historic, cultural and natural resource values.

These areas have economic values as well. The States of Arizona, Colorado, New Mexico and Utah all rank tourism as the number one employer. Tourists spent nearly $9.4 million per day in Arizona in 1981. Nearly $3.9 billion were made in expenditures in the State of Colorado in tourism in 1981. 7.7% of all jobs in the State of New Mexico with a payroll of $252 million are tourism related. In Utah tourists spent nearly $3.5 million per day in 1981.

We must respect these lands not only for their national and international significance but also because they help to create the life blood from which many of us exist.

Today, I am sorry to say we may be guilty of squandering our heritage, that which has been placed in our public trust for future generations, as our parks have been. The West is unique because of our spacious skies, our wide open spaces, our majestic vistas. Yet these very vistas we prize so highly are in danger of being lost for want of political muscle.

Mr. Chairman, the attention and interest you have given in the past in helping to protect visibility and the magnificant views of our national parks has been greatly appreciated. Your help is needed again now, Mr. Chairman.

In 1977 Congress so rightly added to the Clean Air Act protections for the air quality and visibility in these treasured lands. At that time Congress believed that it had mandated that parks and wilderness areas would be afforded special protection. The results of the wanton disregard that former Secretary Watt exhibited for these special lands are still taking their toll on the parks. I speak, Mr. Chairman, about integral vistas, those majestic panoramas citizens of the West prize so dearly.

In 1980 the Department of the Interior was given the opportunity to define, for air quality purposes, the special and specific views so integral to the very purposes for which many of these parks were created. EPA told the DOI it could delineate a list of views and vistas integral to the parks' purposes so that the air officials responsible for permitting new polluting facilities would have to consider (but not necessarily prevent) visible degradation of these priceless treasures. Secretary Watt, fearful that considering the importance of these views might disrupt other forms of economic development, used his best bureaucratic maneuvers to keep this issue out of the public domain until today.

NPCA, under a FOIA request, had released to us by the Department of the Interior the Regulatory Impact Analysis (RIA), the last bureaucratic hurdle, the cost/benefit analysis. This report shows, conclusively, that even couched in the most conservative scenario the benefit of listing and protecting (<u>although that is not required by law</u>) these views and vistas far outweighs the potential costs.

I want to provide you with a short quote from the RIA:

> The NPS integral vista listing will be economically justified even if only a few vistas are protected from undesirable effects. Without accounting for potential impacts to an integral vista in issuing a permit to construct, a state could unknowingly allow significant degradation of a truly unique and widely valued scenic view when options may have been available to both preserve the quality of a vista and the economic attractiveness of the industrial facility. (I-6, Regulatory Impact Analysis, April, 1985)

It is ironic and unfortunate the the cost of preparing the RIA exceeds the cost of merely publishing the factual list as was originally envisioned by two and a half times. A sad waste of the tax payers' dollars.

It is my understanding, Mr. Chairman, that the DOI wants to finalize a list of views important to the national parks. The 1916 Organic Act creating the National Park Service requires this fulfillment of the law and the Department is not inclined to shirk that responsibility. The Office of Management and Budget (OMB), however, for reasons unclear to us is attempting to keep the Department from meeting its December 1985 deadline to finalize this list.

54-972 O - 86 - 9

Mr. Chairman, your strong voice for preserving this unique Western air quality resource is needed now. Don't let OMB, behind closed doors, rob us of our heritage.

WESTERN ACID RAIN SENSITIVITY MAPS

The National Clean Air Fund, the research and educational arm of the National Clean Air Coalition has asked me to present the Committee with copies of the recently released map depicting regions of the West most sensitive to acid rain. The map identifies 55 units of the national forest system, 23 congressionally designated wilderness areas and 11 national parks and national recreation areas that contain surface waters susceptible to acid rain damage. It is the most precise delineation available of the relative sensitivity of western surface water to damage by acid rain.

Alkalinity is a measure of a water body's buffering capacity or its ability to neutralize incoming acids. The less alkalinity there is, the more vulnerable the surface waters are to acid rain.

It is evident from the map and the list of sensitive resource areas, both of which are submitted for the hearing record, that surface waters in the western United States susceptible to damage from acid rain are more sensitive and more widespread than previously recognized. We can avert an impending acid rain disaster in the West by taking steps now to protect our air and water resources.

I have attached to my prepared remarks the elements of a package of Western air quality amendments. I encourage you, Mr. Chairman, to include these ideas in any Clean Air Act amendments you might propose.

Mr. Chairman, much attention has been paid to the effects of acid deposition on aquatic and terrestrial resources. The enormous cost of materials damage caused by acid rain, however, has been called the sleeper issue in the Clean Air Act debate. The New York Times recently reported that the damage figure for materials from acid rain may exceed $5 billion. May I quote from a recent statement released by the American Institute of Architects: "The dollar cost is relatively insignificant compared to the aesthetic and cultural deprivation resulting from the effects of acid rain on materials. All across the country, thousands of outdoor sculptures and monuments, and thousands of irreplaceable historic structures, all of which are unique human statements, are undergoing slow but sure destruction from acid pollution. And as they become lost, a part of the national soul and of the national memory goes with them."

Much new information has been released recently by the National Park Service, the National Clean Air Fund, and others regarding the very serious threat faced by our treasured lands. The more we look at this problem the more frightening the information we uncover. I have with me today a few photos taken through the NPS Visibility Monitoring Network. These photos are all taken with a standrad 35mm camera. They are taken over the course of a year. The photos I will show represent the best, worst and average visibility in these parks. I think you will agree that when one speaks of visual air values photos speak more eloquently than words.

Thank you for the opportunity to testify today.

The Colorado Mountain Club

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U. S. SENATE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

presented by

Anne Vickery
Conservation Director
Colorado Mountain Club
5255 Pennsylvania Ave.
Boulder, Colorado, 80303
(303) 499-3001

August 12, 1985
Denver, Colorado

Senator Hart, Members of the Committee,

My name is Anne Vickery. I am Conservation Director for the Colorado Mountain Club which is a recreation and conservation organization of about 8,000 members. We take over 2,000 hiking, camping and skiing trips each year into the Colorado Rockies and to National Parks, Wilderness areas and scenic areas throughout the United States. I am here today representing those groups and individuals who use and value sensitive high country areas potentially affected by acid deposition. We are grateful to you for coming to Colorado to hear our concerns about this growing ecological threat.

We want you to know that we care a great deal about the high country, the lakes and the forests in Colorado and the west. There are 27 Wilderness Areas, two National Parks and 7 National Forest units in Colorado. Most of these are well above the 9,000 foot sensitivity line for potential acid deposition impacts. Westerners consider these areas and the mountain ranges as watersheds, as recreational areas to be shared with the rest of the nation, and as natural ecosystems to be protected and passed on, in tact, to future generations. Acid deposition can kill forests, increase erosion and destroy watersheds. It can sterilize lakes and discourage recreation. It can do immeasurable damage to natural ecosystems.

We fear that without strict regulation of existing and future sources of pollution, national and international forces over which we have little control will slowly destroy high country ecosystems by literally eating away at the vegetation and silently poisoning the water. We have seen it happen in Europe and the eastern United States. Precipitation events are now occurring in Colorado with a pH as low as 4.7. Short term acidification of mountain lakes during snow melt has been observed near the Maroon Bells-Snowmass Wilderness. Short-term acidification is the first stage of irreversible acidification. Some industry and government officials argue that because Colorado has as yet no totally acidified lakes or dying forests, there is no problem. We need only study the issue further. This position is incredibly naive and shortsighted. Everything possible must be done now to prevent measurable impacts to our ecosystems. As a citizen representative, I can not stress this enough. We want to prevent impacts. We need your help. Congress must recognize this threat and take positive action through substantive legislation.

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Concerns are often expressed about the cost of controls to stationary and mobile sources in order to reduce sulfur and nitrogen oxide emissions. There is, however, no greater cost than trying to repair an ecological tragedy. How much would it cost to reclaim our lakes and forests. Even if dollars were available, restoration may be impossible. Citizens would rather pay up front for pollution reduction in order to keep the air clean. We urge the committee to consider significant tax reductions for industries that have stringent pollution controls. And, we suggest significant pollution taxes on imports from other countries that are produced more cheaply because of weak or non-existent environmental laws.

There is an industrial panel here today which, unfortunately, consists only of polluting industries. They are but one small part of the business community affected by the acid deposition issue. There are major industries in Colorado and the west which can suffer significant financial losses from acid deposition. In Colorado tourism and recreation is the second largest industry in the state and brings in over four billion dollars annually to the state economy. Visitor registers placed on Colorado's fourteen thousand foot peaks consistently show that visitors from an average of 40 states and 6 foreign countries come every year to each of these popular areas.[1] These are the high altitude areas most sensitive to acid deposition. Approximately six hundred million dollars of the tourism income comes from fishing. It is significant that over half of this is spent in urban areas in preparation for a recreational trip.[1] If Colorado gains the reputation of having acidic lakes, the whole tourism industry will suffer.

There are three regulatory issues I would like to bring to your attention.

1) EPA recently published in the federal register a ruling that individual states, through their State Implementation Plans (SIPS) would have the final decision over how much pollution is allowed in federal Class I areas even if this means allowing significant impacts to National Parks, Monuments and Wilderness areas. For EPA to give up its regulatory authority over areas which have been set aside as national treasures and national wildlands would be to violate the public trust and the responsibility of the federal govern-

[1] See attached report by the Colorado Mountain Club: "Colorado's Natural Recreational Resources - An Unrecognized Economic Asset", November 1983.

ment to protect and preserve these lands. In Colorado we could not condone adverse impacts to Rocky Mountain National Park or to the Flattops Wilderness for the benefit of a local smokestack industry. EPA must retain the final authority over federal lands.

2) Since the PSD regulation was instituted there has been confusion over what is meant by cumulative analysis and cumulative impact. Some industries have argued that if their source, analyzed in isolation, is not predicted to violate the increment or cause an adverse impact, that source does not need emission controls. It is only a matter of time before just a few sources, each analyzed in isolation, together can cause significant long term impacts. EPA and the Congress must realize that what is important is not each source in isolation, but the combined cumulative impact of the sources on lakes, forests and wildlife. These combined sources can be located in the same state, in neighboring states or hundreds of miles away. It is the combined cumulative impact that must be analyzed with every permit application. And, each and every source that contributes to air pollution has to be regulated. Otherwise acid deposition prevention is a paper exercise - which we do not want.

3) EPA has recently issued a decision on the Chevron Oil Shale PSD permit. In granting the permit EPA denied a request by the Colorado Mountain Club that EPA would require additional controls if significant impacts were detected in a Class I area. In the decision EPA said that under its interpretation of the Clean Air Act, EPA and the public can monitor impacts occurring in Class I areas, but EPA will not take any regulatory action to reduce the pollution. Under this situation, the PSD section of the Clean Air Act which is to PREVENT significant deterioration loses all meaning. Either EPA's interpretation, or the Act, or the Regulations must be revised so that the intentions behind the PSD regulation can be carried out.

In conclusion, we strongly urge that there be acid deposition legislation which will prevent the acidification of lakes and forests in Colorado and other parts of the west. We urge the legislation include the following:

1) An increment for NO_x and a requirement for stringent NO_x controls;

2) Significant economic incentives for both mobile and stationary sources to reduce emissions;

3) An acid deposition standard;

4) A requirement that polluting industries reduce emissions if monitoring indicates significant impacts in Class I areas;

5) A requirement that states, through their SIPS, must prevent significant adverse impacts to federal Class I areas;

6) A clarification of the cumulative impact provisions so that it is clear that it is the combined, cumulative impact that must be assessed; and, each source that is part of that combined impact must control its emissions.

Thank you. I appreciate the opportunity to appear here today.

The Colorado Mountain Club

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COLORADO'S NATURAL RECREATIONAL RESOURCES
AN UNRECOGNIZED ECONOMIC ASSET

The Colorado Mountain Club

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COLORADO'S NATURAL RECREATIONAL RESOURCES AN UNRECOGNIZED ECONOMIC ASSET

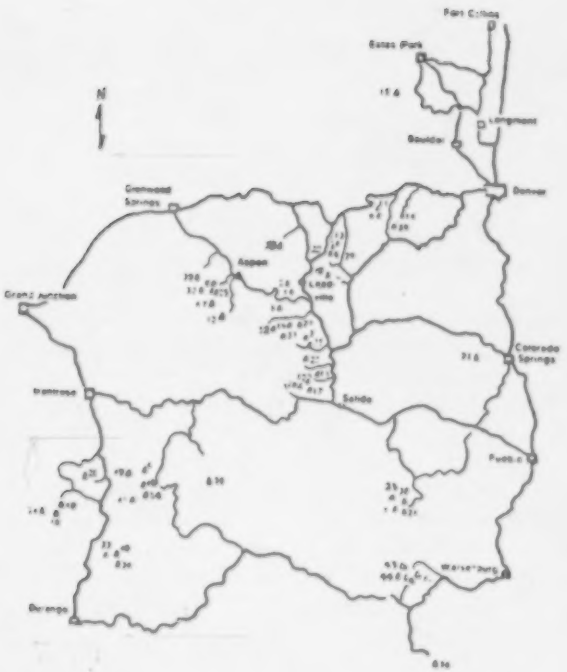
Introduction

Colorado has a wealth of natural recreational resources - high peaks, scenic areas, clean air, good visibility, forest and grasslands, wildlife and fish populations, clean water, streams and lakes. These resources support a stable, state-wide vacation, tourism and outdoor recreation industry which is a major economic asset to the state. During the past twenty years there has been a constant growth in this industry as the number of people using Colorado for outdoor recreation continues to rise. In 1983 tourism, including some aspects of outdoor recreation was estimated as a 3.9 billion industry.

A cohesive recreational management policy is needed for these resources most of which are on public lands managed by diverse agencies. The economic importance of the vacation-tourism-outdoor recreation industry and the economic value of the natural recreational resources which foster this industry need to be recognized. Protection of these resources must become a major factor in planning and development for the state. Following is a partial list of these resources with a discussion of the economic benefits of each.

The Fourteen-Thousand-Foot Peaks

Colorado has 54 peaks over 14,000 feet high. These peaks are located throughout the state (see Figure 1) from Long's Peak in the north to Culebra in the southeast and the Wilson Peaks and El Diente in the southwest. Thirty-five of these peaks are in National Wilderness areas and are protected by federal Wilderness legislation. Nineteen peaks are outside the Wilderness and do not have this protection. It has become a state, national and even international challenge to climb as many of the 14,000 foot peaks as possible. The economic benefits from recreation associated with these peaks are statewide. Each climber needs equipment, transportation, food and lodging and each climber goes home to tell relatives and friends about the climb - a volunteer Colorado Chamber of Commerce.



COLORADO

Roads and 14,000' Peaks

KEY

1	Mount Elbert	14,433
2	Mount Massive	14,421
3	Mount Harvard	14,420
4	Blanca Peak	14,345
5	La Plata Peak	14,336
6	Uncompahgre Peak	14,309
7	Crestone Peak	14,294
8	Mount Lincoln	14,286
9	Grays Peak	14,270
10	Mount Antero	14,269
11	Torreys Peak	14,267
12	Castle Peak	14,265
13	Quandary Peak	14,265
14	Mount Evans	14,264
15	Longs Peak	14,256
16	Mount Wilson	14,246
17	Mount Shavano	14,229
18	Mount Princeton	14,197
19	Mount Belford	14,197
20	Mount Yale	14,196
21	Crestone Needle	14,191
22	Mount Bross	14,172
23	Kit Carson Peak	14,165
24	El Diente	14,159
25	Maroon Peak	14,156
26	Tabeguache Mtn.	14,155
27	Mount Oxford	14,153
28	Mount Sneffels	14,150
29	Mount Democrat	14,148
30	Capitol Peak	14,130
31	Pikes Peak	14,110
32	Snowmass Mountain	14,092
33	Mount Eolus	14,083
34	Windom Peak	14,082
35	Mount Columbia	14,073
36	Culebra Peak	14,069
37	Missouri Mountain	14,067
38	Humboldt Peak	14,064
39	Mount Bierstadt	14,060
40	Sunlight Peak	14,059
41	Handies Peak	14,048
42	Mount Lindsey	14,042
43	Ellingwood Peak	14,042
44	Little Bear Peak	14,037
45	Mount Sneffels	14,036
46	Redcloud Peak	14,034
47	Pyramid Peak	14,018
48	Wilson Peak	14,017
49	Wetterhorn Peak	14,017
50	North Maroon Peak	14,014
51	San Luis Peak	14,014
52	Huron Peak	14,006
53	Mount of the Holy Cross	14,005
54	Sunshine Peak	14,001

Figure 1. Colorado roads and 14,000 foot peaks.

In preparation for this report, the Colorado Mountain Club reviewed registers which it maintains on top of the 14,000 foot peaks. Some registers are chewed by pikas and marmots, soaked by rain and snow and even blown off the peaks. Some are spirited away as souvenirs. It is never known what will be returned to the clubhouse. Analysis of register data shows the 14,000 foot peaks to be a unique attraction in the state (see Table 1). Here are consistent findings:

1. A surprisingly large number of people climb the fourteens;
2. Almost every state in the United States is represented;
3. Many foreign countries are represented;
4. Many climbers come back year after year eventually climbing them all;
5. In recent years the number of climbers has increased dramatically.

For example:

Gray's Peak, near Loveland Pass, 50 miles from Denver, was climbed by 243 people over a 14-day period in August 1981. In a similar 22-day period ending September 5, 1983, 596 people made the ascent. This is a 192% increase in ascents per day. Altogether, over this combined period of 36 days, climbers came from 36 states and 5 foreign countries.

Uncompahgre Peak, near Lake City, was climbed by 744 people between September 6, 1981 and September 4, 1982. These climbers came from 43 states and 7 foreign countries - England, Canada, Holland, El Salvador, Japan, Australia and South Africa.

Crestone Needle, a remote and difficult peak near Westcliff, was climbed by 30 climbers during six days between August 29, 1981 and September 12, 1981. The climbers, from eight different states, had used the back of a section of a map as an innovative register.

Table 1

Selected Summit Register Data

Peak	Nearest Town	Register Dates	Ascents		
Gray's Peak	Georgetown	8/6/81 - 8/20-81	243	25 states	1 foreign country
		8/14/83- 9/5/83	596	30 states	7 foreign countries
Uncompahgre Peak	Lake City	9/5/81 - 9/4/82	744	43 states	7 foreign countries
Crestone Needle	Westcliff	8/29/81- 9/12/81	30	8 states	
Mt. Columbia	Buena Vista	7/14/82- 8/19/83	475	43 states	6 foreign countries
Mt. of the Holy Cross	Minturn	8/1/82 - 9/6/82	315	27 states	8 foreign countries
Mt. Sneffels	Ouray	9/13/81- 8/11/82	471	34 states	7 foreign countries
San Louis Peak	Creede	6/26/82- 9/15/82	164	21 states	2 foreign countries
Castle Peak	Aspen	9/5/80 - 7/5/83	881	40 states	11 foreign countries
Capital Peak	Aspen	8/1/81 - 8/7/83	511	34 states	4 foreign countries
Mt. Elbert	Leadville	7/1/81 - 7/17/82	508	32 states	5 foreign countries
Mt. Oxford	Buena Vista	9/25/82- 11/5/83	470	30 states	5 foreign countries

The conclusion of this review is that the fourteen-thousand-foot peaks are a state, national and international tourist attraction and therefore a major economic asset to the state. It is vital that access to these peaks be maintained and that the high quality of visibility from the tops of the peaks be protected.

Hunting and Fishing

There have been a number of studies of the economic value of fish and wildlife to the state of Colorado. Results generally indicate that the preservation of fish and wildlife, through protection of habitat, is of major importance for the state. In 1981 hunters and fishermen spent over one billion dollars (McKean and Nobe, 1983). 81.9% of this was spent by Colorado residents and the remainder by residents of other states who came to Colorado expressly for the purpose of hunting or fishing. The report did not include out-of-state holders of two and ten-day fishing permits. The figure included "fixed" expenditures - money spent on such permanent or long term equipment as guns, fishing tackle or recreational vehicles used primarily for access to hunting and fishing areas, as well as "variable" expenditures, which include gasoline, food, lodging and auto repairs while traveling.

The McKean and Nobe study breaks down expenditures and activities by the State Management and Planning Regions (see Figure 2). A major conclusion of the

Region	% of Total
1	1.4
2	5.8
3	42.6
4	6.7
5	0.2
6	1.5
7	2.5
8	2.8
9	2.8
10	7.4
11	6.3
12	8.6
13	2.9

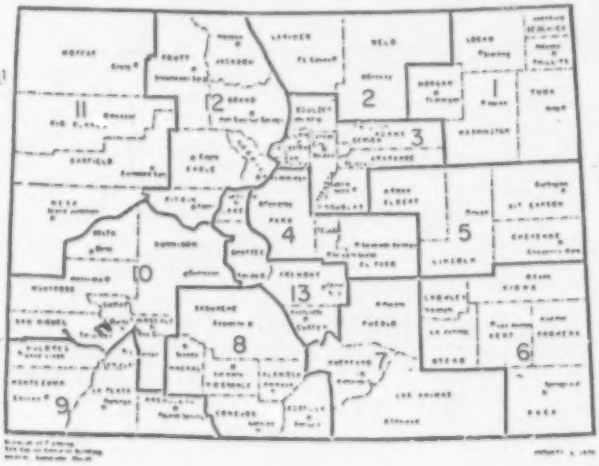


Figure 2. State Planning and Management Regions

report is that fishing and hunting benefit the entire state, not only the areas in which the activity occurs. For example, big game hunters spent a considerable amount of money in the field, but they spent more in Denver preparing for the trip than they did in pursuit of the game. Antelope hunters spent $8.238 million in Denver and $1.091 million in region II, where most of the antelope hunting occurred. Most small game hunting took place in region 1, the northeast section of the state, but most expenditures by small game hunters took place in Denver (region 3) and in Larimer and Weld counties (region 2). $478 million, almost half of the total statewide expenditure, was spent in region 3.

McKean and Nobe determined that 62% of the total was spent by fishermen. Another study (Jentzen, 1982) indicates that most Colorado fishermen, 86.6%, are seeking trout. A study of the economics of instream flow (Walsh, et al., 1980) estimated a 2% per year increase in user days of fishing through 1985. According to this study, 30% of the 12,500 miles of rivers in Colorado have been destroyed or substantially altered (dewatered, inundated or polluted).

If the economic value of recreational fishing is to be maintained in Colorado, the river and stream mileage available for fishing as well as the quality of these rivers and streams must be preserved. It is also apparent from these studies that a healthy wildlife population and lakes and streams which support viable fish populations are major economic assets to the state. Serious threats to wildlife such as reduction of habitat and threats to water quality such as acid deposition could have major economic impacts on the state. Denver legislators and legislators in other population centers need to be aware that the economic repercussions would be greatest in their areas.

White Water Boating

Visitors from throughout the United States have found white water boating on Colorado's free flowing rivers to be some of the best in the nation. In 1982 commercial white water boating generated $25 million in Colorado. This was based on some 300,000 recreational days spent on Colorado rivers. The Western River Guides Association predicts that by 1986 the recreational days will be as high as 500,000. In small river side communities this sport has become an important economic resource to complement skiing, hunting and summer visitor use. Ski resorts such as Vail, Steamboat Springs, Aspen, Breckenridge, Winter Park and Keystone all have strong whitewater programs for early summer months.

The National Forests offer endless possibilities for cross-country skiing - wide valleys, broad ridge tops and forest trails and roads. Many ski areas have taken advantage of these surrounding resources and developed their own cross-country ski programs.

While excellent snow and a variety of slopes attract the skiers, good air quality is an integral part of the appeal. Skiers pause at the top of the Pallavicini lift at Arapaho Basin to spot Mt. of the Holy Cross in the distance. A decidedly Texas accent was heard to say at the top of the Iron Horse Lift at the Mary Jane Ski Area: "This has to be the most beautiful view in all of Colorado!" The ski towns, recognizing that crystalline air and good visibility are vital to skiers' enjoyment, have taken strong measures to protect mountain air quality.

Outdoor Recreation on Federal Lands

About one-third of Colorado's federal lands in the western half of the state are managed for multiple use by the Bureau of Land Management under the Department of Interior. These BLM lands contain 60 areas under evaluation for Wilderness designation and three of the popular 14,000 foot peaks, Redcloud, Sunshine and Handies near Lake City. The Department of Interior also has jurisdiction over Colorado's two National Parks, five National Monuments and four National Wildlife Refuges, which are managed for preservation and recreation. The Department of Agriculture administers eleven National Forests, twenty-four National Wilderness Areas, two National Grasslands and one National Recreation Area. The Forest Service, while managing its lands for multiple use, states in its planning documents that recreation is the major use of the forests in Colorado.

These federal lands are spread throughout the state (see Figure 4) and are major tourist and recreational attractions. Economic benefits from recreational visits to these areas are state-wide. In 1982 there were over five million visitors to the National Parks and Monuments. The Forest Service, in 1982, estimated 1.8 million visitor days (a 12-hour period) for the Wilderness areas. Traveling to these and other federal recreational lands requires food, transportation and lodging. Often extensive hunting, fishing, camping and climbing gear are purchased for the visit. As with the high peaks, in-state and out-of-state visitors return home to tell friends and relatives of their experiences.

Visits to these areas are increasing. In the national parks there are many people on the trails, campsites are full and back-country permits have to be obtained

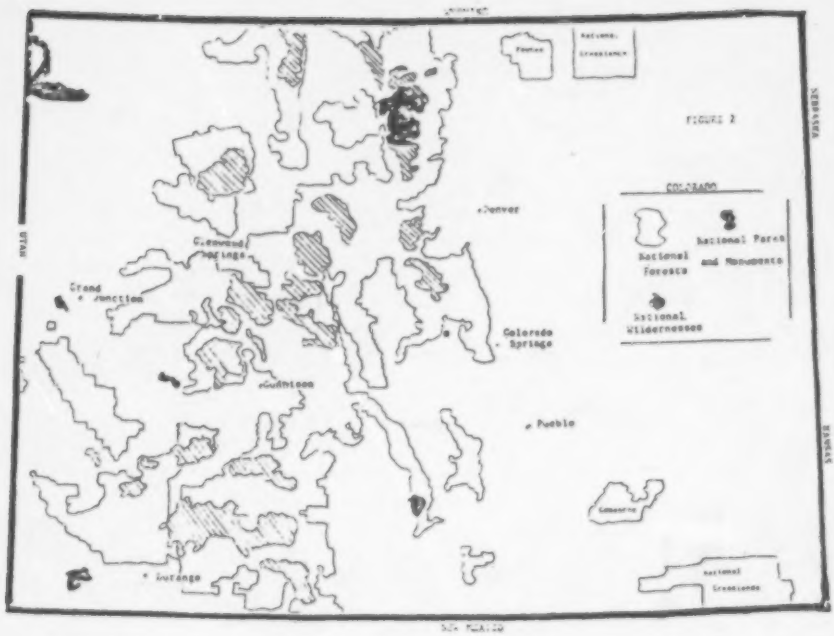


Figure 4. Location of Federal Lands (BLM Lands not shown).

in advance. Those who visit the Wilderness areas know that even parking lots in remote areas with difficult access are often full to overflowing. The demand for Wilderness is so high that the Forest Service is considering permits to limit use in some areas.

Why do visitors come to these areas? What do they value? The Forest Service has sponsored three studies on what attributes visitors value most in Wilderness areas. These studies, based on the Indian Peaks, Eagle's Nest, Rawah and Weminuche Wilderness areas, indicated that clean fresh air, protection of water quality wildlife habitat and air quality and enjoying the sights and sounds of nature were desired most by Wilderness visitors (Brown, et al., 1977; Brown and Haas, 1980;

Walsh, et al., 1982). The Colorado Air Quality Control Commission also recognizes the economic value of clean air. Preserving and protecting clean air "is particularly important for the scenic and recreational areas of the state, where. . . tourism represents a vital . . . segment of the economy. The common link in tourism throughout the State is the scenic view or vista, consistently ranked in visitor opinion polls as one of the most important attributes of the area" (Fiscal Impact Statement, Colorado Prevention of Significant Deterioration Regulation).

Recreational use of federal lands provides a significant day-to-day contribution to most local Colorado economies supporting hotels, motels, restaurants, hardware and sporting goods stores, automobile service stations and guide services. It is essential for the economy that the state protect those resources which draw the visitors: visibility, clean air, clean water, fishable lakes and streams, wildlife and fish populations and popular scenic recreation areas.

Colorado State Parks and Recreation Areas

Colorado has 27 State Parks and Recreation Areas which are widely dispersed throughout the state. These areas offer a broad diversity of activities including boating, fishing, water skiing, rockclimbing, camping and wildlife observation. Many of the areas are close to urban centers and provide excellent recreational opportunities for families and nearby urban populations (see Figure 5).

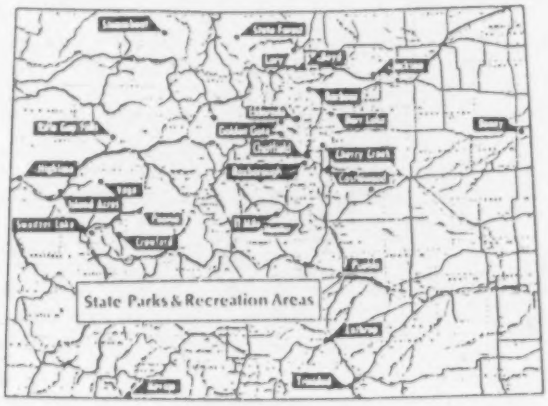


Figure 5. State Parks & Recreation Areas.

During the 1982-83 fiscal year, these areas attracted almost 5 million in-state visitors and 1.3 million out-of-state visitors. These visits generated approximately $54 million to Colorado businesses, with over half, $30 million, coming from out-of-state tourists.

Conclusion

The above information clearly indicates that the vacation-tourism outdoor recreation industry is one of the state's most important, stable, widespread and fastest growing industries. The economic benefits of this industry touch every part of the state. The industry depends for its existence on Colorado's natural recreational resources - high peaks, scenic areas, clean air and good visibility, forests and grasslands, wildlife and fish populations, clean water, streams and lakes. At present the management of these resources is in the hands of many different state, federal and even local and private agencies. The contribution of outdoor recreation and tourism to the Colorado economy, based on these natural resources, is not always a major consideration in management decisions. It is therefore an economic necessity that Colorado:

1. begin to take into account and calculate this contribution;
2. in its planning, and development recognize these natural recreational resources and set policy to protect them from ecological degradation and access restrictions;
3. request that all state, federal and local management agencies and entities do likewise.

This document has been prepared by the Conservation Committee of the Colorado Mountain Club. Principal authors are Anne Vickery, Conservation Director and Jeremy Kaplan, Boulder Group.

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WYOMING OUTDOOR COUNCIL
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STATEMENT OF DEBRA BECK,

EXECUTIVE DIRECTOR,

WYOMING OUTDOOR COUNCIL

AUGUST 12, 1985

Good afternoon. I'm Debra Beck, executive director of the Wyoming Outdoor Council. I'm grateful for the opportunity to address this committee today.

You have heard much about the acid sensitivity of many high elevation ecosystems in the West. Everything we learn, it seems, reinforces our fears that many of our priceless natural areas are extremely vulnerable to damage by acid rain. In the short time allotted to me now, I will not try to repeat that evidence. Instead, I'd like to share with you some insights gained from our experiences trying to protect one of those special areas under the current law.

The Wind River Mountains of Wyoming contains some of the most acid sensitive surface waters (and some of the best fishing!) in the West. Over 2,000 lakes occur in the two Class I wilderness areas there. Some have no measurable alkalinity; all average less than 100 (Galbraith 1985, attached).

In the past 14 months the State has permitted three new sources of acid pollution directly upwind of this fragile area, resulting in an additional 8,000 tons of SO_2 and 1,400 tons NO_x annually. Concerned about potential impacts in the Wind Rivers, the Outdoor Council participated actively in the permitting processes.

Wyoming air quality regulations on Class I area protection contain language identical to that of the 1977 Clean Air Act amendments. Congress' intent in passing those amendments was to prevent air pollution related damage to Class I areas. In fact, the Senate declared that, in the case of doubt, the decision to permit a new facility should "err on the side of protecting air quality values."

Permits are being issued in Wyoming, however, in spite of considerable doubt about potential effects. Let me give you some examples.

1. Decisions are based on little or no information about the baseline condition of Class I area resources.

2. Air quality impacts are predicted at distances which are 2 to 4 times model design limits, and 5 times the distances at which the models have been tested.

3. Air dispersion models are used to predict sulfur and nitrogen deposition rates--a use never intended for these models and unconfirmed by field testing.

4. Total acid deposition is estimated by predicting dry deposition rates and assuming that the rate of wet deposition will be the same. There is no information that this is true in the West; in fact, nearly all agree that the rates (and the ratio) vary with precipitation, terrain, elevation, and many other factors.

5. Current acid deposition estimation techniques take no account of precipitation rate or the effects of clouds or fog. This very likely results in significant underestimation of total deposition at high elevations.

6. Water chemistry changes are predicted for so-called "indicator" lakes, although more sensitive lakes exist which may be impacted sooner and more severely by acid deposition.

7. Impact predictions ignore acid deposition resulting from out-of-state sources. (A study by Environmental Defense Fund indicates the southwestern copper smelters may actually dominate sulfur deposition in the Wind Rivers and other remote locations.)

8. Only annual impacts are estimated. Short term changes (such as acid shock in lakes) and potential long term cumulative effects are not addressed.

9. Finally, it has been suggested that, in deciding whether a proposed source would adversely affect a Class I area, the regulatory agency should consider the potential impact of that source <u>alone</u>, not its cumulative effect with other sources. This contravenes the intent and the very definition of "prevention of significant deterioration."

These problems and deficiencies evidence more than a need to clarify procedure. Prompt action by Congress is desperately needed to ensure that acid deposition damage to Class I areas is prevented, as the Clean Air Act intends.

What are the options? We could simply stop permitting new sources, until the necessary baseline data and accurate predictive tools are available, but I think it is obvious that this is not an economically viable approach.

We could set a regional cap on emissions equal to current levels, and permit new development only with offsets or as the natural attrition of old facilities allows. This, too, is unacceptable--probably to industry, but also to those who believe that current pollution levels are already causing environmental impacts, such as the springtime acidification of certain California and Colorado lakes.

There is a third alternative which is both workable and fair. It involves first--and this is absolutely essential--cleaning up or shutting down the Phelps Dodge (Douglas) and Magma (San Manuel) smelters. This will reduce regional acid pollution, alleviating existing impacts and providing a cushion for future growth. Second, the Nacozari smelter (and any future Mexican smelter or smelter expansion) must be equipped with SO_2 controls before going on line. Third, new trucks and buses must be equipped with NO_x controls similar to those required for automobiles. Best available control technology must be required on new major stationary sources of NO_x. NO_x increments must be established. And finally, the Clean Air Act should be amended to strengthen and clarify Class I protection language and to provide a mechanism for remedying Class I impacts should they occur.

The costs of these measures are reasonable--particularly when compared to the ultimate costs of doing nothing. Failure to spend whatever it costs to prevent acid deposition damage in the West could result in exorbitant losses to the recreation, tourism, and forest products industries, and in immeasurable impacts to fish and wildlife habitat, soils, and aesthetic values.

We must not be deluded by industry representatives, scientists, regulatory officials, or anyone else who advocates inaction on the basis of the uncertainties or complexities this issue. If we wait until we have all the answers they say we need, the questions will be moot.

ACID DEPOSITION IN THE WIND RIVER MOUNTAINS [1]

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Introduction

Acid rain has become a preeminent environmental issue (7,19). Since the original discovery of acid rain in the Scandinavian countries and subsequent verification at Hubbard Brook, New Hampshire (11), attention in the United States has been focused on the damage occurring in the eastern United States. Until quite recently, the conventional wisdom held that in the western United States the airsheds were still pristine. This view of a time that once was is no longer the reality of air quality in the Rocky Mountain West. Investigations in Colorado (2,6,9,10) and now in Wyoming (5) have shown that acid precipitation is taking place with annual weighted volume average pH of 4.6 to 4.7 having been observed. In this paper, the implications of acid deposition in the highly sensitive alpine environment of the Wind River Mountains will be discussed.

[1] This article first appeared in the "Proceedings of Watershed Management in The Eighties-New Direction" held during the annual convention of the American Society of Civil Engineers, April 30-May 1, 1985, Denver, Colorado.

Potential Source Areas

The mandate of "affirmative responsibility" to protect the air quality and related values of the designated Class 1 areas under the 1977 Clean Air Act has caused the Forest Service to examine the potential for adverse effects in the Bridger and Fitzpatrick Wildernesses, Class 1 areas in the Wind River Mountains of Wyoming. The existence of established and proposed industrial operations emitting SO_2, NO_x, and COS upwind of the Wind River Mountains, confirms the potential for local Wyoming sources. These sources have produced over 150,000 tons annually of acid rain precursors. Additionally, there is little doubt that the urban-industrial Wasatch Front in Utah contributes air pollution to the Upper Green River basin setting of the Wind River Mountains. Rather strong circumstantial findings of air flow patterns from Arizona and northern Mexico suggest a source area associated with the copper smelter complex in this region (1). The well documented long range transport of sulphates and nitrates (3) would also implicate the generally upwind Los Angeles basin as another likely source area. The apportioning of acid deposition among suspect source areas is an important and, as yet, unanswered question.

Watershed Features Related to Buffering Capacity

Alkalinity is considered to be the chemical property of a lake which best integrates the geochemical production of basic cations, the atmospheric deposition of alkaline substances, and the

planktonic metabolic processes, all of which control the acid neutralizing capability of the lake water (20). There are approximately 2000 lakes in the Wind River Mountains. A survey of 92 lakes in the Wind River Mountains has produced alkalinity measurements ranging from 10 to 160 ueq/l at elevations mainly from 9,000 to 12,000 feet (2740-3670 meters) (17). The highest elevation cirque basin lakes generally have the lowest alkalinity values and are thought to be the most susceptible to acidification. Despite the fact that two earlier lakes surveys which measured alkalinity have been made in the Wind River Mountain lakes, it is not possible at this time to compare results due to the imprecision of the earlier methods. Nevertheless, the alkalinity results indicate a very low buffering reserve for these lakes. Based upon the national study by Omernick and Powers (15), lakes in the Wind River Mountains are well below the 200 ueq/l alkalinity established for "sensitive" lakes.

The Wind River Mountains are composed of Precambrian metamorphic and igneous rock. The metamorphic component is comprised of migmatite, migmatic gneiss, felsic gneiss. The igneous fraction is made of granodiorite, granite, and porphyritic granite. From a geochemical standpoint the rocks have quite low contents of basic cations Ca and Mg primarily, of which a considerable portion is retained in resistate minerals (22). Like

granitic areas in Scandinavia, eastern Canada, and the Adirondack Mountains, the capacity to neutralize acids is very limited in the Wind River Mountains due to the nature of the bedrock geology.

In a like manner the soils in the lake watersheds have an extemely low buffering capacity. Base saturation is less than 25% for the most part. The soils are shallow (less than one foot [0.3m] deep), have 50% rock content on the average, and are acidic; average pH of 5.2 (14). Based upon analytical results of similar soils (6), it is doubtful that the soils in the Wind River Mountains have significant sulfate adsorption capacity. In the higher elevation lake watersheds soils have a sparse surface distribution - less than 25% for one of the long-term monitor lake watersheds. Preliminary modeling (5) of the soil hydrology has confirmed the minor buffering effect to be expected of the watershed soils.

Results of Monitoring

The Forest Service has mounted a monitoring program in the Bridger and Fitzpatrick Wildernesses designed to detect future adverse changes in air quality, water and soil chemistry, aquatic biology, and terrestrial vegetation which could result from air pollution (21). Field measurements have taken place for the past two years. Since 1982, an atmospheric deposition station in the

national NADP program has been located near the boundary of the Bridger Wilderness close to Pinedale, Wyoming. The annual volume weighted average pH for Nov. 1982 to Nov. 1983 was 4.62 for this NADP site. Combining winter analyses of snow chemistry with the NADP summer measurements showed the H+ ion deposition to be nearly balanced by that of SO_4^{-2} and NO_3^{-1} for the same period. The precipitation acidity for the summer and fall season was nearly three times that of the winter months, possibly reflecting differences in the storm tracking and source areas for those two seasons (5).

The water chemistry analyses from the long-term monitor lakes have shown all the lakes maintaining a positive alkalinity balance, near neutral pH of 6.4 to 6.9, and moderate SO_4^{-2} concentrations of 20 to 35 ueq/l. By comparison, heavily acidified lakes in the northeast U.S. have SO_4^{-2} concentrations well above 100 ueq/l (6). Soil base saturation levels have been established for permanent transects and will be remeasured periodically. While the base saturations are low and the soils relatively acid, these conditions appear to be the norm for alpine soils dominated by spruce-fir vegetation.

Collections of stream insect larvae and lake zooplankton are an important part of the baseline. Norwegian studies have demon-

strated a pronounced decline of macroinvertebrates and zooplankton which are intolerant of increased acidity (16). These invertebrates may be excellent "early warning" indicators due to their sensitivity to rather small increases in acidity. Our collections have identified species such as the mayfly, Ephemerella doddsi, or groups such as Daphnia and the copopods which may be quite intolerant of acidity increases (13). An evaluation of populations rather than individual species may prove more diagnostic of change. Relative species abundance, community structure and diversity are believed to be highly sensitive to stresses such as acidity increase (13).

The vegetation investigation was begun by a lichen analysis conducted by Dr. Mason Hale of the Smithsonian Institute. Dr. Hale has identified the lichen, Xanthoparmelia cumberlandia, as the most optimum indicator of air pollution. A heavy metals analysis of this species taken from the Bridger Wilderness revealed a higher concentration of lead than found in the same species in Colorado at a comparable elevation. Not only was the lead concentration three times greater but the concentration increased with elevation in the Bridger Wilderness but was unchanged with elevation in Colorado (8). This finding of an elevation relationship to lead concentration strongly suggests an orographic effect on atmospheric deposition.

Conclusions

What emerges rather clearly from the discussion of characteristics such as the geology, soils, and vegetative pattern is the realization of how acutely limited is the capacity of these watersheds to neutralize acid deposition. From a national perspective certain areas in the east are receiving nearly 100 ueq/l in acid precipitation (4). The average lake alkalinity in the Wind River Mountains is 70 to 80 ueq/l. An increase of acid deposition of two to three times the current levels would place the Bridger and Fitzpatrick Wildernesses on a par with areas in the northeast where granitic watershed lakes have acidified. Furthermore, a threshold of acidic deposition represented by an annual pH of 4.7 has been proposed for grantitic watershed lakes (23). Based on lakes data from Scandinavia, eastern Canada, and northeastern U.S., lake acidification has been observed when the average precipitation pH has fallen below this 4.7 threshold. As previously mentioned, the 1983 average precipitation pH for the NADP site near the Wind River Mountains was 4.62.

A closely related threshold relating to sulfur deposition has achieved a consensus within the scientific community. This

threshold establishes 5 kg/hectare/yr of sulfur deposition as a maximum above which lake acidification has occurred (18). At the Pinedale NADP site the annual deposition for 1983 was 1.3 kg. If the orographic effect noted earlier is taken into account, at the higher precipitation zones in the Wind River Mountains the annual deposition could have been 3 to 4 times the amount recorded at the NADP site. And this measured amount is wet deposition only. In addition, the possible unmeasured increases in sulfur deposition due to rime ice and cloud water reported elsewhere (12) would increase the total. Therefore, it seems quite likely that the Bridger and Fitzpatrick Wildernesses have experienced sulfur deposition in the past close to the 5 kg/H/yr threshold.

This discussion of thresholds highlights a key question - at what level of atmospheric deposition of acid, sulfate and/or nitrate ions will the watersheds in the Wind River Mountains be unable to generate a commensurate amount of buffering? The watersheds can be expected to vary in their response to atmospheric deposition within a 3- to 4-fold range corresponding to the variation in lake alkalinities. But, whatever the threshold for acid deposition turns out to be for the most sensitive cirque-basin lakes, these lakes will acidify rapidly, should the threshold be exceeded, due to the lack of soil retention of the acidifying, mobile anions. Our ability to protect the resources of air, water, soil, and vegetation in the Bridger and Fitzpatrick Wildernesses may, in large part, depend upon our ability to accurately predict the acidification thresholds.

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The Colorado
MINING ASSOCIATION

August 16, 1985

The Honorable Robert T. Stafford
Chairman
United States Senate
Committee on Environment & Public Workes
Washington, DC 20510

RE: United States Senate
Committee on Environment & Public Workes
Hearings on Western Acid Rain
Denver, Colorado, August 12, 1985

Dear Senator Stafford:

The Colorado Mining Association (CMA) established in 1876 and incorporated in 1897, is a trade association whose membership numbering 150 companies and 1,800 individuals is composed of both small and large enterprises engaged in the exploration for, production and refining of, metals, coal, oil shale and industrial minerals; firms that manufacture and distribute mining and mineral processing equipment and supplies; and other institutions serving the mineral industry.

A representative of CMA was present at the captioned hearing. However, since CMA has a vital interest in this issue and was neither invited to testify nor advised of the hearing, we respectfully request that the CMA's position with respect to acid rain, set forth below, be entered into the record of the hearing.

> CMA believes that more information is needed concerning the causes, extent and effects, if any, linking coal combustion to acidic deposition and permitting a valid cost-benefit analysis before any expensive emission reduction measures are adopted by Congress.
>
> If, at a future date, sufficient evidence proves who the principal contributors to acid deposition are, then emission reduction measures should be considered. Individual emittors should, at that time, be given flexibility in selecting their own method or combinations of methods to meet performance limitation, so long as existing federal and state emissions requirements are not otherwise affected. This will premit the marketplace to determine the least costly methods of reducing unwanted emissions and encourage the

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use of the many options available. Under no instance should a uniform, national or regional tax be imposed on coal-fired power plants. These taxes would impose penalties on utilities that have taken costly steps to limit emissions through state of the art emission-reducing equipment and/or commitments.

We appreciate this opportunity to express our views and look forward to working with the Committee in the future.

Sincerely,

COLORADO MINING ASSOCIATION

David R. Cole
President

DRC:lja
xc: Senator Hart
Senator Armstrong